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U.S. Department of the Interior
Bureau of Land Management
Wyoming State Office

Rock Springs Field Office January 2004

DECISION RECORD, FINDING OF NO SIGNIFICANT IMPACT and ENVIRONMENTAL ASSESSMENT for Burlington Resources' Little Monument Natural Gas Project

2004-112486/NF ©

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-04/008+1310

WYW-040-EA03-186

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Rock Springs District Office
280 Highway 191 North
Rock Springs, Wyoming 82901

1792, 1310
Little Monument Unit

January 9, 2004

Dear Reader:

The Bureau of Land Management (BLM) is providing you with a copy of the attached Decision Record, Finding of No Significant Impact, and Environmental Assessment for Burlington's Little Monument Natural Gas Project for your information and use. The Decision Record identifies BLM's decision, explains the rationale for reaching the decision, and identifies measures to protect the environment.

The Environmental Assessment was prepared pursuant to the National Environmental Policy Act, other regulations and statutes to fully disclose potential impacts of the proposal and the alternative of no action. The BLM released a scoping notice to the public on December 3, 2002. All comments received during scoping have been considered and documented in the analysis and/or the decision. BLM has provided responses to the comment letters received during public scoping (refer to Appendix A of the attached decision). No unresolved issues remain.

The BLM wishes to thank those who provided input during the analysis process. Your input is essential in assuring all issues important to you were fully considered. Should you have questions regarding this document, please contact either Teri Deakins at 307-352-0211 or George Schoenfeld at 307-352-0271.

Sincerely,

Ted Murphy
Assistant Field Manager,
Lands and Minerals

Attachment

DECISION RECORD
FINDING OF NO SIGNIFICANT IMPACT
for
LITTLE MONUMENT NATURAL GAS PROJECT

INTRODUCTION

Burlington Resources Oil and Gas Company LP (Burlington) has notified the Bureau of Land Management (BLM), Rock Springs Field Office (RSFO) that the company intends to drill additional exploration and development wells in the Little Monument Project Area (LMPA) located in Sections 21 through 23, and 26 through 28, Township 25 North and Range 111 West, 6th Principal Meridian, Sweetwater County, Wyoming (Figure 1-1). The project area includes approximately 3,857 acres. All surface and mineral rights are on public lands managed by the BLM.

Burlington proposes to drill, complete, and produce approximately 31 additional wells at 8 or more wells per section within the LMPA over the next 3 years. Drilling operations are proposed to begin once regulatory permits are secured and would continue over the next 3 years depending on the success of the drilling program. In addition to wellpads and associated construction, Burlington anticipates that additional infrastructure such as access roads and pipeline would be necessary to further develop the resource. Additional gas volumes would be transported via existing trunk pipelines, but additional gathering pipelines are anticipated should drilling prove successful.

The LMPA lies within the Lincoln Road Project area that was previously studied for oil and gas development in the Fontenelle Natural Gas Infill Drilling Projects Environmental Impact Statement (EIS) (USDI-BLM 1995), which analyzed for a well density of 4 to 8 wells per section (80 to 160 acre spacing). The amended Record of Decision (ROD) approved 1,095 wells (780 on BLM-administered public lands and 315 wells on public lands managed by the Bureau of Reclamation) within the Lincoln Road project area beyond the 287 existing wells producing at the time. To date, there are 418 producing wells within the townships overlapping the Lincoln Road project area.

The EIS noted 95 wells drilled (72 wells producing) within T. 25 N., R. 111 W., and the decision approved an additional 158 wells within the township for a total of 253 wells (95 wells drilled + 158 new wells). To date, there are 139 producing wells in the township. The addition of 31 wells within this township is well within the scope of the analysis prepared for the Lincoln Road project area of the Fontenelle Natural Gas Infill Drilling Projects EIS.

ALTERNATIVES CONSIDERED

Two alternatives were analyzed in detail. The Proposed Action assumes the construction of 31 wells and associated roads and pipelines. The LMPA would have approximately 55.8 acres of new surface disturbance associated with well locations and approximately 35.6 acres of total site disturbance associated with road and pipeline construction. Total new short-term surface disturbance resulting from the Proposed Action would be 91.4 acres (approximately 2.4 percent of the LMPA). During the life-of-

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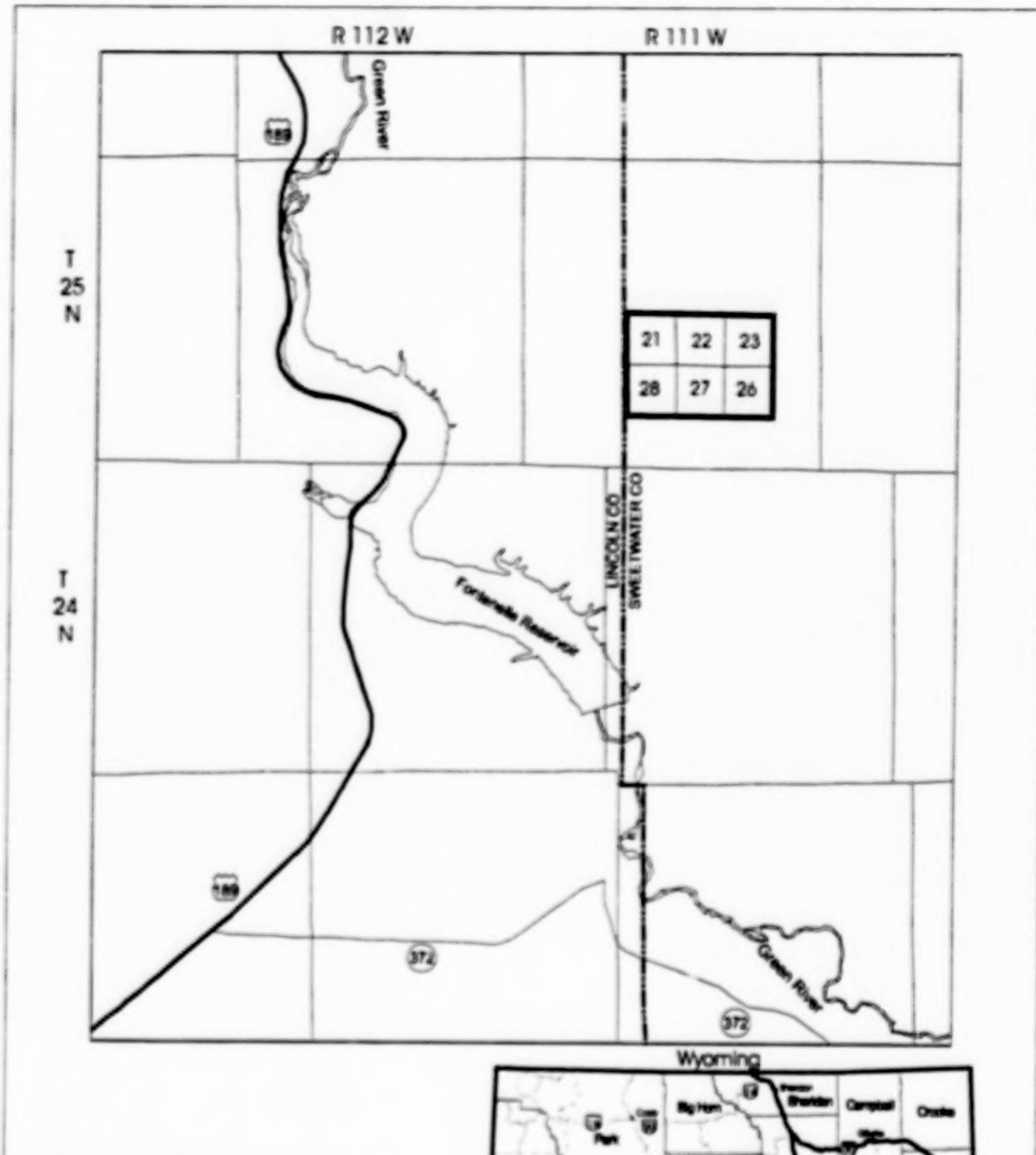

Figure 1-1. Location of the Little Monument Natural Gas Project, Sweetwater County Wyoming.

project (LOP), 15-20 years, total disturbances would be reduced to approximately 40 acres (31.0 acres associated with 31 wells having 1.0 acre of remaining disturbance per well site, and 9 acres of roads) or approximately 1.0 percent of the 3,857-acre LMPA

The No Acton Alternative would deny Burlinton's drilling and development proposal as submitted. The Amended Record of Decision for the Fontenelle Natural Gas Infill Drilling Projects (USDI, BLM 1997) authorized 780 wells on BLM administered lands within the Lincoln Road Project Area, which includes the LMPA. A total of 418 producing wells have been permitted on federal lands in the townships overlying the Lincoln Road project area. The Fontenelle AROD permits drilling on 80 acre spacing and while Burlington's Proposed Action requests drilling on less than 80 acre spacing, the No Action alternative would result in a continuation of the approved drilling program.

Alternatives Considered but Eliminated Detailed Study

The BLM considered an alternative that would allow Burlington to develop fewer wells on a tighter well spacing, but concluded that the number of wells in the Proposed Action was the fewest justifiable to rigorously define the gas resource in the LMPA. Because the Proposed Action constitutes the minimum number of wells needed, an alternative for fewer wells was deemed impracticable.

The BLM also examined utilization of horizontal or directional drilling to minimize surface disturbance. This alternative is not evaluated further for the following reasons:

- Economics – horizontally drilled wells are estimated to cost up to 300% as much as similar vertically drilled wells with no commensurate increase in production. (EIA 1993) The Vermillion Basin EA DR/FONSI, Appendix D (USDI, 2002) estimates directional drilling costs at 140% of vertically drilled wells. This resource extraction method is a process driven by subsurface geologic criteria.
- Reservoir issues – The Frontier Formation (the target pay zone for the LMPA) is fairly deep (greater than 9,000 feet below the surface) and of limited porosity. Fracture stimulation is key to the development of an economic gas well in this type of formation. Horizontal or directional drilled wells can exhibit more severe problems than vertical wells due to collapse of the formation into the wellbore during fracture stimulation. In addition, horizontal drilling technology requires precise control of target locations in three dimensions. Even the thickest gas producing zones in the project area are below the vertical resolution of current seismic technology and yield no target control for lateral drilling. Thus, without the knowledge of gas seam locations, directional drilling would not produce the desired results.
- Surface disturbance – the LMPA is a mature gas producing area with 31 existing gas wells within the sections affected by this action. Burlington is proposing to drill another 31 wells which would disturb approximately 94 acres.

DECISION

Based upon the analysis of the potential environmental impacts described in the attached Environmental Assessment for the Little Monument Natural Gas Project, and in consideration of internal, public, industry, and governmental agency comments received during public scoping, and that no unresolved issues remain after analysis, BLM approves the Proposed Action alternative as described in Chapter 2 in the attached Environmental Assessment. Approval of the project will allow Burlington to gain authorization of the required permits to drill and rights-of-way to implement project components on public lands administered by the BLM. Project-wide applicant committed measures (Chapter 2) and approved mitigation from Chapter 4 provide conditions of approval or stipulations for actions on public lands. All measures required to eliminate or reduce impacts on public lands are identified in Appendix A of this decision.

Approved Project Components

This decision authorizes processing of applications for permit to drill or right-of-way applications for the following project components on BLM-administered public lands and minerals within the project area, subject to the requirements identified in Appendix A of this decision. Construction of components will be completed as described in Section 2.2 of the attached Environmental Assessment. Approval of permits for individual components is required prior to surface disturbing activities.

Construction of 31 wells and associated roads and pipelines. The action would result in approximately 55.8 acres of new surface disturbance from well locations and approximately 35.6 acres of disturbance associated with road and pipeline construction. Total new short-term surface disturbance resulting from the Proposed Action would be 91.4 acres. Should production ensue, life-of-project (15-20 years) disturbance would be reduced to approximately 40 acres (31.0 acres associated with 31 wells having 1.0 acre of remaining disturbance per well site, and 9 acres of roads) or approximately 1.0 percent of the 3,857-acre LMPA.

Land Disturbance Summary
Little Monument Project Area

Project Component	Initial Disturbance Acres	Life-of-Project Disturbance Acres
31 Well Pads	55.8	31.0
Roads and Pipelines	17.8	9.0
Pipelines	17.8	0.0
Total	**91.4**	**40.0**

Burlington may require ancillary facilities to meet production needs. Such facilities may include, but not be limited to: (1) individual well site liquids recovery units, (2) gas metering stations, (3) pipeline pigging facilities, (4) field storage buildings, and (5) cathodic protection facilities. The number and location of such ancillary facilities is unknown at this time, but most would be installed within the boundaries of existing disturbances and would be subject to appropriate permitting requirements.

Additional compression may be required to transport some of the new production, but Burlington in not anticipating any for this Proposed Action. If any compression is required, it would be analyzed with an action for pipeline or other transportation system.

MANAGEMENT CONSIDERATION/RATIONALE FOR THE DECISION

The decision to approve the Proposed Action is based on the following factors.

1. Consistency with Resource Management Plan and Other Land Use Plans

The Proposed Action is in conformance with the Green River Resource Management Plan (RMP). The objective for oil and gas management is to "provide consideration for oil and gas leasing, exploration, and development of oil and gas while protecting other values." Public lands within the checkerboard area are open to mineral leasing and development to promote mineral resource recovery with appropriate mitigation measures applied on a case-by-case basis. The objective of the realty program is to "manage the public lands to support the goals and objectives of other resource programs" and "to respond to public demand for land use authorizations." The proposal is in compliance with state and county land use plans and/or policies.

In addition, the Proposed Action is well within the threshold for impacts analyzed in the Fontenelle Natural Gas Infill Drilling Projects EIS. The LMPA lies within the Lincoln Road project area analyzed in the aforementioned EIS. The amended Record of Decision (ROD) approved 1,095 wells within the Lincoln Road project area beyond the 287 existing wells producing at the time the decision was rendered. To date, there are 418 producing wells within the townships overlapping the Lincoln Road Project area. The EIS noted 95 wells drilled (72 wells producing) within T. 25 N., R. 111 W., and the decision approved an additional 158 wells within the township for a total of 253 wells (95 wells drilled + 158 new wells). To date, there are 139 producing wells in this township. The addition of 31 wells within this township is well within the scope of the analysis prepared for the Lincoln Road project area of the Fontenelle Natural Gas Infill Drilling Projects EIS.

2. National Policy

Private exploration and development of federal oil and gas leases is an integral part of the BLM oil and gas leasing program under the authority of the Mineral Leasing Act of 1920, as amended and the Federal Land Policy and Management Act of 1976, as amended. The United States continues to rely on foreign energy sources. The BLM oil and gas program is designed to encourage development of domestic oil and gas reserves, particularly in the checkerboard area. This decision is consistent with national policy. In addition, analyzing a comprehensive drilling program complies with existing policy to analyze proposed development within a geographic area.

3. Agency Statutory Requirements

This decision is consistent with all federal, state, and county authorizing actions required to implement the Proposed Action. All pertinent statutory requirements applicable to this proposal were considered. Any necessary conferencing or consultation with U.S. Fish and Wildlife Service has been completed (Appendix B

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of this decision). Compliance with Section 106 of the Historic Preservation Act will be completed prior to approval of permits for individual components.

4. Relevant Resource and Economic Issues

Potential impacts from Burlington's proposal to surface and subsurface resources identified in the attached Environmental Assessment are considered to be insignificant (necessary and due) after application of the protective measures proposed and mitigation identified in attached analysis. These measures are described in Appendix A of this decision. The economic benefits derived from implementation of the Proposed Action in the form of continuing employment opportunities, equipment, services, and potential revenues should production of natural gas ensue are considered important.

5. Application of Measures to Avoid or Minimize Environmental Impacts

Federal environmental protection laws (e.g., Clean Air Act, Clean Water Act, etc.) apply to all public lands administered by the BLM and are included as part of the standard oil and gas lease terms and the terms and conditions of right-of-way grants. In addition, adoption of measures found in Appendix A of this decision provides a practicable means to avoid or minimize potential impacts to the environment. These measures will be attached to approved permits. Should conditions warrant, additional measures could be applied to individual permits or rights-of-way subject to additional environmental analysis.

6. Opportunity for Public Involvement

BLM initiated public scoping on December 3, 2002. Ten comment letters were received in response. All issues, concerns, and alternatives brought forth during public scoping have been considered during the analysis, documented, and no unresolved issues remain. BLM has provided responses to individual scoping comment letters in Appendix C of this decision.

FINDING OF NO SIGNIFICANT IMPACT

Based upon the analysis contained in the attached Environmental Assessment for the Little Monument Natural Gas Project and with implementation of the protective measures identified in Appendix A of this decision, the Proposed Action will not cause a significant impact to the quality of the human, natural, and physical environment. Therefore, an environmental impact statement is not necessary.

APPEAL

Under BLM regulations, this decision is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this decision must include the information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing to the State Director (920), Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, within 20 business days of the date such notice of decision was received or considered to have been received. This decision will be considered to have been received seven (7) business days after the date it is mailed.

The decision of the State Director could be appealed to the Interior Board of Land Appeals in accordance with the regulations contained in 43 CFR 3165.4 and 43 CFR Part 4. Each adverse party to any such appeal must be provided with all documentation in accordance with 43 CFR 4.413(a). The adverse parties to any appeal of the decision by the State Director include:

Eileen Dey
Burlington Resources
3300 North "A" Street, Bldg 6
Midland, TX 79705-5406

SIGNATURE

Assistant Field Manager,
Lands and Minerals

January 9, 2004
Date

APPENDIX A
APPROVED PROTECTIVE MEASURES

Construction, operation, and reclamation procedures will follow the plan of operations described in Section 2.2 of the attached EA. The following measures were either proposed by the applicant or identified during the analysis process and will be required for all components proposed on public lands administered by the BLM. An exception to a mitigation measure or design feature may be approved on a case-by-case basis if deemed appropriate by the BLM. An exception will be approved only after a thorough, site-specific analysis determines that the resource or land use for which the measure was put in place is not present or will not be adversely impacted.

Applicant-committed Practices

Cultural Resources

- Class III surveys will be completed on areas proposed for surface disturbance prior to initiation of the disturbance, and reports will be submitted to the BLM, RSFO. Burlington and contractors will inform their employees about relevant federal regulations protecting cultural resources. If any cultural remains, monument sites, objects, or antiquities, subject to the *Antiquities Act of June 8, 1906* or the *Archaeological Resources Protection Act of 1979*, are discovered during construction, activities shall immediately cease and the responsible AO will be notified.

Paleontological Resources

- Literature and records review and field check did not lead to the identification of scientifically significant fossil resources within the project area. The Green River Formation (Laney Member), which underlies the project area in its entirety, is recognized by the BLM as a sensitive formation (Class 5 formation) known to contain scientifically significant fossil resources elsewhere in Wyoming, including not far from the project area boundaries. As a result of the apparent absence of significant fossil resources in the project area, monitoring of surface disturbance is not recommended, however provision for the accidental discovery of such resources is recommended. If paleontological resources are uncovered during construction activities, Burlington or their contractors will suspend all operations to prevent further disturbance of such materials and will immediately contact the BLM's AO, who will arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan. Mitigation of paleontological resources will occur on a case-by-case basis, and Burlington will be responsible for the associated costs.

Air Quality/Noise

- Burlington will not burn garbage or refuse at the drill sites or other facilities. All vehicles and construction equipment will be maintained to minimize exhaust emissions and will be properly muffled to minimize noise. Disturbed areas will be watered as necessary to suppress dust. Burlington employees and contractors will observe speed limits.

- In any area of operations (drill site, construction areas, etc.) where noise levels may exceed federal OSHA safe limits, Burlington Resources and its contractors will provide and require the use of proper personnel protective equipment by employees.

Vegetation and Wetlands

- Removal and disturbance of vegetation will be kept at a minimum through construction site management (e.g., using previously disturbed areas and existing easements, limiting equipment/material, storage yard and staging area size, etc.).

- Well locations and associated roads and pipelines will be located to avoid or minimize impacts in areas of high value (e.g., sensitive species' habitats, wetland/riparian areas).

- Proper erosion and sediment control structures and techniques will be incorporated by Burlington into the design of well pads, roads, pipelines, and other facilities. Revegetation using a BLM-approved, locally adapted seed mixture containing native grasses, forbs, and shrubs will begin in the first appropriate season following disturbance.

- Crossing of ephemeral, intermittent, and perennial streams associated with road and utility line construction will generally be restricted until after spring runoff and normal flows are established.

- Channel crossings by pipelines will be constructed so that the pipe is buried at least 4 feet below the channel bottom.

- Channel crossings by roads and pipelines will be constructed perpendicular to flow. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.

- Disturbed channel beds will be shaped to their approximate original configuration.

- Operators will avoid disturbance within 500 feet of wetland/riparian areas and open water area and within 100 feet of ephemeral/intermittent drainages, where possible. This includes fueling, servicing, and staging of vehicles.

- Any disturbances to wetlands and/or waters of the U.S. will be coordinated with the U.S. Army Corps of Engineers (COE), and 404 permits will be secured as necessary prior to disturbance.

- Burlington will evaluate all project facility sites for occurrence of waters of the U.S., special aquatic sites, and wetlands, per COE requirements. All project activities will be located outside of these sensitive areas, where practical.

- Where disturbance of wetlands, riparian areas, streams, and ephemeral/intermittent stream channels cannot be avoided, COE Section 404 permits will be obtained by Burlington as necessary.

Wildlife

Burlington will comply with the following guidelines concerning avoidance of raptor nests and greater sage-grouse leks and nesting areas.

Raptors

- Where feasible, pipeline ROW's will be selected and designed to avoid disturbance to raptor nests. If construction activities are to occur between February 1 and July 31, surveys for raptor nests within 0.5 to 1.0 mile of the proposed surface disturbances will be conducted to determine nest occupancy. All construction activities will be restricted between February 1 and July 31 within a 0.5-mile radius of all occupied raptor nests except ferruginous hawk and bald eagle nests, for which the seasonal buffer will be 1.0 mile. Surface structures requiring repeated human presence will not be constructed within 825 feet (1,970 feet for eagles) of active raptor nests, where practical. An active raptor nest is defined as a nest that has been occupied within the past three years.

Greater Sage-grouse

- Surface disturbance within 0.25 mile of any sage-grouse lek will be avoided. If construction activities are planned in potential sage-grouse nesting habitat (i.e., areas within 2.0 miles of an active lek) between February 1 and July 31, BLM wildlife biologists will conduct field evaluations to identify active nests. If an active sage-grouse nest is identified in an area proposed for disturbance, construction activities will be delayed until nesting is completed and the young are fledged.

Sensitive Animals and Plants

- The BLM will conduct FWS consultation and coordination as necessary for all mitigation activities relating to listed, or proposed for listing, threatened and endangered species and their habitats. In areas that have not been previously surveyed or cleared for these species, a qualified biologist/botanist will conduct surveys for these species in areas of potential habitat prior to disturbance, and if found, consultation with the FWS will be initiated, as necessary, and construction activities will be curtailed until the BLM, FWS, and Burlington concur on which activities can be authorized.

Health and Safety

- Construction sites will be maintained in a sanitary condition at all times. Waste materials (human waste, trash, garbage, refuse, etc.) will be disposed of promptly at an appropriate waste disposal site. A litter policing program, approved by the AO, will be implemented by Burlington to cover all roads and other sites associated with the LMPA.

- During construction and upon commencement of production operations, Burlington will have a chemical or hazardous substance inventory for all such items that may be at the site. Burlington will institute a Hazard Communication Program for its employees and will require subcontractor programs in accordance with OSHA CFR 1910.1200. All employees will receive the proper training in storage, handling, and disposal of hazardous substances.

- Spill Prevention Control and Countermeasure (SPCC) Plans will be written and implemented as necessary in accordance with 40 CFR Part 112 to prevent discharge into navigable waters of the United States.

Existing Utilities

- Burlington will secure an ROW on public lands from the BLM prior to construction and will notify other authorized ROW users of any pipeline crossings or overlaps. Any associated building or zoning on river, creek, or utility crossing permits will be secured from the appropriate regulatory agency or private entity prior to construction.

Visual Resources

- Burlington will restore the disturbed areas to as near its original contour as possible as soon as the work allows. The disturbed areas will be planted with the seed mixture(s) recommended by Burlington and approved by the BLM. All aboveground facilities will be painted with Carlsbad Canyon 2.5Y 6/2 or a similar color determined by the AO to blend with the surrounding landscape, except for structures that require safety coloration in accordance with OSHA requirements.

Recreation

- Burlington will minimize conflicts between project vehicles and equipment and recreation traffic by posting appropriate warning signs, implementing operator safety training, and requiring project vehicles to adhere to low speed limits.

Water Resources

- Burlington will minimize impacts to surface waters by design and construction of interception ditches, sediment traps, silt fences, water bars and revegetation, and soil stabilization measures as needed.

- Burlington will case wells during drilling, and case and cement all wells in accordance with Onshore Order No. 2 to protect accessible high quality water aquifers. Well casing and weldments will be of sufficient integrity to contain all fluids under high pressure during drilling and completion. Further, wells will adhere to the appropriate BLM cementing policy.

- Reserve pits will be constructed to prevent seepage of fluids, utilizing drilling mud gel or poly liners. The liner will be impermeable and chemically compatible with all substances which may be put in the pit. Burlington will maintain two feet of freeboard on the reserve pits at all times to avoid the overflow danger.

- Burlington will implement a pollution prevention plan (PPP) for storm water runoff at drill sites as required by the Wyoming Department of Environmental Quality (WDEQ) storm water NPDES permit requirements. The WDEQ requires operators to obtain a field permit for fields of 20 wells or more.

- Burlington will coordinate all crossings or encroachments of waters of the U.S. with the COE.

Soils

- Burlington will minimize areas of disturbance to the minimum required for safely accomplishing their objectives. Where feasible, pipelines will be located adjacent to roads to minimize disturbance. Burlington will install runoff and erosion control measures such as water bars, berms, and interceptor ditches as needed. Culverts for ephemeral and intermittent drainage crossings will be installed.

- Burlington will include adequate drainage control devices and measures in road design (e.g., road berms and drainage ditches, diversion ditches, cross drains, culverts, out-sloping, and energy dissipators) at sufficient intervals and intensities to adequately control and direct surface runoff above, below, and within the road environment to avoid erosive, concentrated flows. In conjunction with surface runoff or drainage control measures, Burlington will use erosion control devices and measures such as temporary barriers, ditch blocks, erosion stops, mattes, mulches, and vegetative covers.

- Upon completion of construction activities, Burlington will restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites. Re-seeding will be performed pursuant to APD/ROW stipulations. In addition, Burlington will reclaim illegal access roads and other disturbances in the LMPA which are not being utilized by current Burlington operations.

- Burlington will reseed all disturbed areas to BLM specifications. The following procedures are recommended to assure that all disturbed areas are stabilized and that revegetation efforts are enhanced so that adverse impacts do not occur (USDI-BLM 1997, USDI-BLM 1999b).
    - Scarification. Prior to revegetation, all compacted areas will be scarified by ripping or chiseling to loosen compacted soils. Scarification promotes water infiltration, better soil aeration and root penetration. Scarification will be done when soils are dry to promote shattering of compacted soil layers.
    - Seedbed Preparation. Proper seedbed preparation is critical for seed establishment. Seedbed preparation will be conducted immediately prior to seeding to prepare a firm seedbed conducive to proper seed placement and moisture retention. Seedbed preparation will also be

performed to break up surface crusts and to eliminate weeds, which may have developed between final grading and seeding. In most cases, chiseling is sufficient because it leaves a surface smooth enough to accommodate a tractor-drawn drill seeder and rough enough to catch broadcast seed and trap moisture and runoff. In low to moderate saline soils, a firm, weed-free seedbed is recommended. With high salinity levels, particularly when a high water table is involved, a fallow condition may not provide the best seedbed. If existing vegetation and weeds are chemically eradicated, the remaining dessicated roots and stems improve moisture infiltration and percolation, reduces evaporation from the soil surface, and protects emerging seedlings (Majerus 1996).

[illegible]	[illegible]	[illegible]
Western wheatgrass	'Rosanna'	4.0
Sandberg bluegrass		2.0
Indian ricegrass		3.0
Bottlebrush squirreltail		1.0
Scarlet globemallow		1.0
Gardner saltbush		2.0
Shadscale		2.0
TOTAL		**15.0**
[illegible]	[illegible]	[illegible]
Tufted hairgrass		2.0
Basin wildrye		5.0
Slough grass		6.0
Bluejoint reedgrass		3.0
TOTAL		**16.0**
[illegible] SOILS	[illegible]	[illegible]
Thickspike wheatgrass	'Critana'	4.0
Western wheatgrass	'Rosanna'	4.0
Indian ricegrass		4.0
Scarlet globemallow		1.0
Winterfat		2.0
Fourwing saltbush or shadscale		1.0
TOTAL		**16.0**

- Seed Mixtures. Seed mixtures will be specified on a site-specific basis and their selection will be justified in terms of local vegetation and soil conditions. Livestock palatability and wildlife habitat needs will be given consideration in seed mix formulation. The recommended general seed mixtures shown in the table below were developed from observation of successful revegetation in the Green River Basin region and observation of dominant species in the project area. These mixtures comply with Executive Order (EO) 13112 (Invasive Species). EO 13112 also specifies that use of any introduced plant species must have prior BLM approval for federal lands.

- BLM guidance for native seed use is BLM Manual 1745 (Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants). The WGFD recommends that BLM consider shrub species in seed mixtures. BLM will coordinate with WGFD to insure that the correct shrub species are incorporated into seed mixtures on federal lands. Native species that will be considered include bluebunch wheatgrass, streambank wheatgrass, needle-and-thread grass and Wyoming big sagebrush. Fall seeding will occur from about September 15 until ground freeze or snow pack prevents critical seed soil coverage. The optimum time to seed a forage or cover crop in saline-alkaline soils is late fall (mid-October to December) or during a snow-free period during the winter (Majerus 1996). Ideally, in saline-alkaline soils, the seed should be in the ground before the spring season so that it can take advantage of the diluting effects of early spring moisture. Spring seeding will be completed by May 30 or as directed by the BLM. Seed will be used within 12 months of testing.

- Seeding Method. Drill seeding will be used where the terrain is accessible by equipment. The planting depth for most forage species is 1/4 to 1/2 inch (5-10 mm). A double disk drill equipped with depth bands will ensure optimum seed placement. The seed will be separated by boxes to prevent seed from separating due to size and weight. Rice hulls or other appropriate material will be added to the seed as necessary to prevent separation. The drill will be properly calibrated so that seed is distributed according to the rates specified for each seed mix.

- Areas too steep for drill seeding or where approved by the BLM, broadcast seeding may also be used. Broadcasted seed should occur onto a rough seedbed and then should be lightly harrowed, chained or raked to cover the seed. The seeding rate should be doubled for the recommended mixtures because the mixtures were developed for drill seeding. The method used to cover the seed should be selected so that the seed is lightly covered but maintains the surface in rough condition. The broadcast seeder should be properly calibrated or the seeding should occur over a calculated known area so that the proper seeding rate is applied.

- Mulching. Where mulching is deemed necessary, a certified weed-free straw or hay mulch will be crimped into the soil at an application rate of two to four tons per acre. Mulches will be applied by blowers, spreaders or by hand. The mulch will not be finely shredded during application and mulch strand lengths will be long enough to be anchored by crimping. The mulch will be spread uniformly over the area so that 75 percent or more of the ground surface is covered. Mulch will be crimped to a depth of two to three inches.

Additional Measures Required by the BLM

- Should fossil resources be uncovered during surface disturbance associated with the Proposed Action, the project proponent or authorized personnel should immediately notify the BLM and work should cease immediately in the area of the discovery until the fossil remains can be evaluated for scientific significance by a qualified paleontologist. If fossil remains of significance are identified, additional mitigation may be proposed. Additional mitigation could include collection, identification, and curation of the fossil remains and potentially monitoring of on-going surface disturbance in the area of discovery.

- Burlington shall coordinate with affected livestock operators to minimize disruption during livestock operations, including calving and lambing. In addition, as noted in Chapter 2, once the new roads are constructed, Burlington will reclaim existing illegal shortcut roads in the LMPA and sign them for no commercial use. No additional measures will be required other than those specified in Chapter 2, Burlington's APD's and by existing RMP and BLM standard mitigation practices for surface-disturbing and disruptive activities.

- Mitigation procedures will be implemented if a site considered eligible or listed on the National Register is impacted. Avoidance is preferred and is achieved through redesign of a project, elimination of the project, or minimizing impacts. However, these means are not always possible. Mitigation of adverse effects to properties will be accomplished by the documentation of physical remains. Mitigation will include data recovery of prehistoric and historic sites and could include documentation through detailed drawings and photographs of standing structures. Data recovery plans are subject to review and approval by the BLM and SHPO, pursuant to BLM State Protocol agreement.

- Mitigation could also include interpretation of significant resources, stabilization of resources, and research vital to understanding resources (e.g. paleo-environmental studies). Such measures are routinely developed through consultation with SHPO and negotiations with the applicant.

- Mitigation for impacts on State highways will include rigorous adherence to WYDOT regulations regarding oversize and overweight loads. Mitigation for County Roads will include Burlington and contractor policies to reinforce speed limits and other traffic safety laws and to reinforce weight and width limits on one-lane bridges on SCR 8 and LCR 318.

- Burlington should coordinate emergency response planning with the Sweetwater County Emergency Management Agency and provide documentation regarding compliance with Federal Hazardous Material Regulations and the Uniform Fire Code.

APPENDIX B
U.S. FISH AND WILDLIFE SERVICE
FORMAL CONSULTATION LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/W.02/WY7180
ES-6-RO-94-F-006(a)-WY78

May 2, 2003

Memorandum

To: Ted Murphy, Assistant Field Manager, Bureau of Land Management, Rock Springs Field Office, Rock Springs, Wyoming

From: Jodi L. Bush, Assistant Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Formal Consultation on Colorado River Depletions for the Little Monument Unit Natural Gas Project

Thank you for your letter of April 25, 2003, regarding the proposed Little Monument Natural Gas Project located in T25N, R111W, sections 21-23, and 26-28, in Sweetwater County, Wyoming. In accordance with section 7 (a)(2) of the Endangered Species Act of 1973 (Act), as amended, 50 CFR §402.13, the U.S. Fish and Wildlife Service (Service) has reviewed the information provided regarding the impacts of the proposed project on the endangered fishes of the Colorado River system. We understand that the proposed action will cause an average annual depletion of 4.67 acre-feet.

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) was initiated on January 22, 1988. The Recovery program was intended to be the reasonable and prudent alternative to avoid jeopardy to the endangered fish by depletions from the Upper Colorado River.

In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (Plan) which identifies actions currently believed to be required to recover the endangered fish in the most expeditious manner in the Upper Colorado River Basin.

A part of the Recovery Program was the requirement that if a project was going to result in a depletion, a depletion fee would be paid to help support the Recovery Program. On July 5, 1994, the Service issued a biological opinion determining that the fee for depletions of 100 acre-feet or less would no longer be required. This was based on the premise that the Recovery Program has made sufficient progress to be considered the reasonable and prudent alternative avoiding the likelihood of jeopardy to the endangered fishes and avoiding destruction or adverse modification of their critical habitat by depletions of 100 acre-feet or less. Therefore, **the depletion fee for this project is waived**.

Permits or other documents authorizing specific projects, which result in depletions, should state that the Bureau of Land Management retains discretionary authority over each project for the purpose of endangered species consultation. If the Recovery Program is unable to implement the Plan in a timely manner, reinitiation of section 7 consultation may be required so that a new reasonable and prudent alternative can be developed by the Service.

This concludes consultation pursuant to the regulations implementing the Act, 50 C.F.R. § 402.14. This project should be re-analyzed if new information reveals effects of the action that may affect listed or proposed species or designated or proposed critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed or proposed species or designated or proposed critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this project.

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have further questions on this subject, please contact Kathleen Erwin of my staff at the letterhead address or phone (307) 772-2374, extension 28.

c: WGFD, Lander, Non-Game Coordinator (B. Oakleaf)
WGFD, Cheyennne, Statewide Habitat Protection Coordinator (T. Collins)

APPENDIX C
COMMENT LETTERS

The BLM received 10 comment letters in response to pubic scoping. Comments are stated below in italics with BLM responses in regular font.

Petroleum Association of Wyoming

The Petroleum Association of Wyoming (PAW) would like to thank BLM for the opportunity to comment on the referenced document. PAW is Wyoming's largest and oldest oil and gas trade organization, the members of which account for over ninety percent of the natural gas and over eighty percent of the crude oil' produced in the State. This project will directly affect members of PAW.

PAW has the following comments regarding the above referenced document:

1. *The Applicant is proposing to utilize much of the existing infrastructure and surface facilities in an area that is currently being developed for oil and gas and is proposing minimal construction of additional roads and gathering lines. The project proponent is bound by the stipulations in the Green River Resource Management Plan, the Amended Record of Decision for Fontenelle Natural Gas Infill Drilling Projects/EIS, along with standard lease terms. By utilizing existing infrastructure, the mandatory mitigation in effect is more than adequate for this proposed project and additional concerns can be analyzed in an Environmental Assessment.*

   This proposed action will assist in extending the life of the current field production in order to maximize recovery of the resource while the infrastructure is in place. Surface disturbance and cumulative impacts' are anticipated to be minimal and there is nothing present to indicate that an Environmental Impact Statement is necessary for this project.

2. *There is not enough detailed information in the scoping statement to identify reasonable alternatives that should be evaluated in the environmental analysis. Once the agencies determine the level of analysis for the project, the agencies and the operator should develop reasonable alternatives when drafting the NEPA document. PAW believes that with the lack of information available, it is premature to identify alterNatives at this time.*

3. *A detailed analysis should be included in the environmental document addressing socio-economic impacts and the positive affects the project will have for the State of Wyoming and the local counties and communities. A section of the document should discuss the "local economy" significance criteria. PAW recognizes that the social and economic opportunities generated from the project would continue to benefit the residents of Wyoming and the participating counties by directly creating new jobs and producing additional revenues.*

In conclusion, PAW supports the proposed action and believes that the Applicant and Agencies will adequately address concerns during the appropriate level of NEPA analysis. BLM is encouraged to move forward with the development of this document in a timely manner.

Thank you for your comments. Your comments have been considered in the analysis.

Wyoming Game and Fish Department

Terrestrial Considerations:

The Little Monument Unit is outside of 11 Sensitive Resource Value Protection Areas" (e.g., wetlands, crucial winter range, raptor and greater sage grouse nesting areas, etc.) identified in Appendix D of the amended Record of Decision. The area is spring-summer-fall range for pronghorn in the Sublette herd unit. Sage grouse are also present, along with the typical assemblage of other game and non-game wildlife common to this habitat type.

We are concerned that increasing the well density above eight wells per section may result in unanticipated resource impacts. Issues that should be analyzed include the impacts of increasing levels of habitat fragmentation in the area as a result of the increasing well density, and the impacts of dust to wildlife and vegetation from both the short-term exploration and the potential long-term development and maintenance activities associated with the project.

We applaud the efforts by BLM to monitor the effects of gas development on wildlife resources.

Aquatic Considerations:

The proposed project is within the headwaters of an ephemeral drainage that connects with Fourmile Gulch, which eventually drains into the Green River via Eightmile Canyon just upstream of the Big Sandy River confluence.

This ephemeral drainage may transport sediments generated from the drilling and well operations into the Green River. The Green River is a trout fishery of state-wide importance that draws commerce to Sweetwater County from many other states. The Green River also supports populations of native non-game fishes, including flannelmouth sucker, bluehead sucker, speckled dace, and mountain sucker. The Department has categorized the flannelmouth sucker and bluehead sucker as Status 1 species. Status 1 species are populations that are physically isolated and/or exist at extremely low densities throughout their range, with habitat conditions that are declining or vulnerable. Therefore, the Department has been directed by the Wyoming Game and Fish Commission, through the Commission's Mitigation Policy, to recommend that no loss of habitat function for these species occur. Some modification of habitat may occur, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged). This project Is conducted in a manner that avoids increasing sedimentation, then impacts to the above mentioned species would be avoided. Measures that Burlington Resources Oil and Gas Company can take to avoid sediment from reaching the Green River include:

- *Disturbed banks of intermittent streams should be stabilized with large angular rock (greater than 2 feet in one dimension) or wire enclosed riprap structures. Riprap should be placed from the channel bottom to the top of the normal high water line on the bank.*
- *The stabilizing material should be placed flush with the undisturbed banks on either side of the rehabilitated area.*
- *Riparian canopy or stabilizing vegetation should not be removed if possible. Crushing or shearing streamside woody vegetation is preferable to complete removal. Any such*

vegetation that is removed in conjunction with stream crossings should be re-established immediately following completion of the crossing.

- *Riparian areas and floodplains should not be used as staging or refueling areas. Operations should be kept at least 150 feet from streams and riparian areas.*

Thank you for your comments. They have been considered in the analysis.

State Engineer's Office

While the project proponents did not acknowledge the necessity for obtaining permits to appropriate water from the State Engineer's Office for purposes of drilling and completing the proposed wells, a check of the records of this office revealed that a permit to appropriate surface water from the Green River under the Burlington Resources Water Haul, Pernlit No. 32627 has been obtained from the State Engineer's Office. However, this permit allows the use of this water at drilling locations only within the SW1/4SW1/4 of Section 23, T. 25 N. R. III W. If the rest of the lease is to be developed as outlined in the Scoping Statement, additional permit(s) will need to be obtained from the State Engineer's Office in order to utilize water from the Green River, or any other area source, at all of the drilling and completing locations specified in the Scoring Statement.

Thank you for your comments. They have been considered in the analysis.

Department of State Parks and Cultural Resources

Management of cultural resources on Bureau of Land Management (BLM) projects is conducted in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulation!) 36 CFR Part 800. These regulations call for survey, evaluation and protection of significant historic and archeological sites prior to any disturbance. Provided the BLM follows the procedures established in the regulations, we have no objection to the project. Specific comments on the project's effect on cultural resource sites will be provided to the BLM when we review the cultural resource documentation called fur in 36 CFR Part 800. Please refer to SHPO project control number lZ02SESO13 on any future correspondence dealing with this project. If you have any questions contact Sara Sheen at 307-777-7498 or me at 307-777-6311.

Thank you for your comments. They have been considered in the analysis.

Fish and Wildlife Service

General Comments

You have stated that the analysis for the proposed project will tier to the Fontenelle Natural Gas Infill Drilling Project, Environmental Impact Statement (EIS), (Final EIS May 1996, Record of Decision March 1997). However, the Operator's proposal to increase the wells per section to 8 or more does not fall within the parameters of the EIS. The U.S. Fish and Wildlife Service (Service) recommends that you conduct an adequate assessment of site-specific environmental effects from the proposed increase in wells per section. The increase in wells per section is supported by your determination that the project impact area is outside of a designated "Sensitive Resource Area" (e.g., wetlands, raptor and Greater sage grouse nesting, etc.). Nevertheless, the *project area offers suitable habitat for mountain plover (Charadrius montanus), potential habitat for black-footed ferret (Mustela nigripes), in the form of prairie dog ((Cynomys spp.) towns, and nesting and foraging habitat for several species of migratory birds (personal communication with Lorraine Keith, Rock Springs Bureau Office, December 17, 2002). The Service believes that oil and gas development has added to the degradation of wildlife resources within the project area, resulting in the non-sensitive designation. Therefore, we recommend that the Environmental Analysis (EA) further justify the need for an increase in wells per section.*

We recommend that you consider alternatives that will reduce habitat fragmentation and acres of land disturbed, such as placing multiple wells per well pad and directional drilling, clustering pipelines, access roads and compressor stations and burying powerlines within existing right-of-ways. In addition, when possible, utilize the sharing of flow lines and compressor stations among operators. Generators should be powered by natural gas to reduce toxic emissions, and compressors should befitted with high quality mufflers to keep noise to a minimum and reduce noise pollution. Development should be phased in over time in any given area to reduce the intensity of impacts to fish and wildlife populations and their habitat. Areas disturbed during development should be reclaimed with native soils and restored with native plants immediately after cessation of production in order to reduce potential adverse affects to native ecosystems and endemic species.

The Service recommends that the EA disclose the full extent of development, as well as the direct and indirect effects of all aspects of the project and the cumulative impacts of past, present and reasonably foreseeable future actions.

> Thank you for your comments. They have been considered in the analysis.

Specific Comments

The Bureau, and their non-Federal representatives should work with the Service in developing surveys, impact minimization measures, and conservation measures for all Federally listed species. If the proposed project may affect a listed species, consultation with the Service pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (Act), (50 CFR § 402.13) will be required. Section 7 (a)(l) of the Act directs Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation and recovery of listed species. Therefore we encourage the Bureau to incorporate measures into the project design for the conservation of listed species.

In accordance with section 7(c) of the Act, my staff has determined that the following threatened or endangered species, or species proposed for listing under the Act, may be present in the project area. We would appreciate receiving information as to the status of each of these species within the project area.

Species	*Status*	*Expected Occurrence*
Black-footed ferret	*Endangered*	*Potential habitat in prairie dogs (Cymomys sp) towns*
Bald eagle	*Threatened*	*Nesting. Winter resident. Migrant*
Ute Ladies'-tresses	*Threatened*	*Seasonally moist soils and wet meadows of drainages below 7000 feet elevation*

Black-footed ferret: Black-footed ferrets may be affected if prairie dog towns are impacted. If white-tailed prairie dog (Cynomys leucurus) towns or complexes greater than 200 acres will be disturbed, surveys for ferrets are recommended in order to determine if the action will result in an adverse effect to the species. Surveys are recommended even if only a portion of the town or complex will be disturbed. According to the Black-Footed Ferret Survey Guidelines (USFWS 1989), a prairie dog complex consists of two or more neighboring prairie dog towns each less than 4.34 miles from each other. If a field check indicates that prairie dog towns may be affected, you should contact this office for guidance on ferret surveys.

Bald eagle: Habitat loss remains a threat to the bald eagle's full recovery. Disease, lack of food, bad weather, or human interference can kill eaglets, sometimes only about half will survive their first year. In order to reduce potential adverse effects to the bald eagle a disturbance-free buffer zone of 1-mile should be maintained around their nests. Activity within 1-mile of an eagle nest may disturb the eagles and result in incidental "take."

Mountain Plover[1]: The mountain plover is associated with shortgrass prairie, plains, alkali flats, agricultural lands, cultivated lands, sod farms, prairie dog towns, and shrub-stepped landscapes at both breeding and wintering locales. Plovers may nest on sites where vegetation is sparse or absent, or near closely cropped areas, manure piles or rocky areas. Mountain plovers are rarely found near water and show a preference for previously disturbed areas or modified habitat where a sufficient prey base (invertebrates) is available. The birds occupy suitable breeding habitat in many of the great Plains states from Canada south to Texas from late March through July.

To avoid project delays should the mountain plover become listed as a threatened species, the Service recommends determining the effects of the project on mountain plover habitat now. If listed, any changes to potential plover habitat resulting in a permanent habitat impact, regardless of the timing of the project, could result in a may effect, likely to adversely effect determination. Should the mountain plover be listed prior to, or during, construction not only will surveys be required under the Act, but construction may be delayed while the BLM reinitiates consultation with the Service if formal conferencing has not previously occurred.

If you determine that mountain plovers occur within the project area, we ask that you coordinate with this office to discuss whether the proposed project is likely to cause jeopardy to the species, and identify measures that would minimize or eliminate any potential adverse effect. The Service recommends surveys for plovers according to the Mountain Plover Survey Guidelines, (USFWS March 2002), in all suitable habitat as well as avoidance of nesting areas to minimize adverse

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[1] The USFWS has determined this species does not warrant listing at this time. BLM treats this species as a sensitive species.

impacts to plovers within a project site. In some cases, project activities can be conducted between August 15 and March 15 to avoid affecting this species.

> Thank you for your comments. They have been considered in the analysis.

Migratory Birds

Under the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 and Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668, the Bureau has a mandatory obligation to protect the many species of migratory birds, including eagles and other raptors which may occur on lands under their jurisdiction. The MBT A, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations and does not require intent to be proven. Section 703 of the Act states, "Unless and except as permitted by regulations ...it shall be unlawful at any time, by any means or in any manner, to ...take, capture, kill, attempt to take, capture, or kill, or possess ...any migratory bird, any part, nest, or eggs of any such bird..." The BGEPA prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.

Work that could lead to the take of a migratory bird including an eagle, their young, eggs, or nests (for example, if you are going to erect new well sites, roads, or power lines in the vicinity of a nest), should be coordinated with our office before any actions are taken. Removal or destruction of such nests, or causing abandonment of a nest could constitute violation of one or both of the above statutes. Removal of any active migratory bird nest or nest tree is prohibited.

Permits for nest manipulation, including removal or relocation may, under certain circumstances, be issued for inactive nests only. For golden eagles, inactive nest permits are limited to activities involving resource extraction or human health and safety. Mitigation, as determined by the local Service field office, may be required for loss of these nests. No permits will be issued for an active nest of any migratory bird species, unless removal of an active nest is necessary for reasons of human health and safety. Therefore, if nesting migratory birds are present on, or near the project area, timing is a significant consideration and needs to be addressed in project planning.

If nest manipulation is proposed for this project, the project proponent should contact the Service's Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued for this project. No nest manipulation is 'allowed' without a permit; If a permit cannot be issued the project may need to be modified to ensure take of a migratory bird or eagle, their young, eggs or nest will not occur.

> Thank you for your comments. They have been considered in the analysis.

Candidate Species

The yellow -billed cuckoo (Coccyzus americanus) is a candidate for listing as threatened or endangered and may occur in riparian areas west of the Continental Divide. Many Federal agencies have policies to protect candidate species from further population declines. We would appreciate receiving any information available on the status of this species in or near the project *area. In addition, if the yellow-billed cuckoo is listed prior to completion of your project, unnecessary delays may be avoided by considering project impacts to candidates now.*

> Thank you for your comments. They have been considered in the analysis.

Greater Sage Grouse

Greater sage grouse (Centrocercus urophasianus) are declining throughout their range. Anecdotal information, from several sources in Wyoming, suggests that sage grouse populations are negatively affected by construction activities, especially those that degrade important sagebrush habitat, even when mitigative measures are implemented (Braun 1998, Lyon 2000). There is some evidence that grouse populations do repopulate oil and gas developed areas (Braun 1987). However, there is no evidence that populations attain their previous levels and reestablishment of sage grouse in a reclaimed area may take as long as 20-30 years (Braun 1998). Please consider the importance of crucial wintering habitat for sage grouse during project planning by minimizing loss of sage brush.

We encourage the Bureau to take all necessary measures allowable to protect the sage grouse in the project area to ensure this project does not exacerbate factors contributing to this species' decline. Your analysis should clearly identify the amount and type of sage grouse habitat (lek, nesting, brood rearing) affected by this project. We recommend avoidance of any activity that would disrupt brood rearing during the period June 1 through July 31. In addition, we recommend that you contact the local Wyoming Game and Fish biologist to more accurately determine the local hatch dates, and areas of nesting and brood rearing habitat along the project right-of-way.

In 2000, the U.S. Forest Service, the Bureau of Land Management, and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding (MOU) with the Western Association of Fish and Wildlife Agencies to conserve the greater sage-grouse and its habitat. This MOU outlined the participation of Federal agencies in greater sage-grouse conservation, and these commitments should be considered in project planning in sage-grouse habitat. Additionally, unless site-specific information is available, greater sage-grouse habitat should be managed following the guidelines by Connelly et al. 2000.

> Thank you for your comments. They have been considered in the analysis.

Water Depletions

If the proposed action will lead to water depletion (consumption) in the Colorado River System, impacts to the endangered bonytail (Gila elegans), Colorado pikeminnow (Ptychocheilus lucius), humpback chub (Gila cypha), and the razorback sucker (Xyrauchen texanus) should be included in the evaluation.

In general, depletions include evaporative losses and/or consumptive use. Project elements that could be associated with depletions to the Colorado River system include, but are not limited to, ponds (detention/recreation/irrigation storage/stock watering), lakes (recreation/irrigation storage/municipal storage/power generation), reservoirs (recreation/irrigation storage/municipal storage/power generation), created or enhanced wetlands, pipelines, wells, diversion structures, and water treatment facilities.

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Any actions that may result in a water depletion to the Colorado River system should be identified. The document should also include an estimate of the amount and timing (by month) of average annual water depletion (both existing and new depletions), and describe methods of arriving at such estimates.

> Thank you for your comments. They have been considered in the analysis and formal consultation has been completed.

Consultation

Section 7 (c)(2), of the Act, requires consultation with the Service when a Federal action may affect a listed species. This consultation will ensure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after it has determined if its action may affect (adversely or beneficially) a listed species. Section 7(a)(4) requires conferencing with the Service when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or an adverse modification of proposed critical habitat. Section 7(c) requires that a biological assessment be prepared for any Federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species.

If a biological assessment is not required (i.e., all other actions), the lead Federal agency is responsible for review of proposed activities to determine whether listed species will be affected. The Service would appreciate the opportunity to review any such determination document. If it is determined that the proposed activities may affect a listed species, you should contact this office to discuss consultation requirements. If it is determined that any Federal agency program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so we can work together to determine how the project could be modified to reduce impacts to listed species to the "not likely to adversely affect" threshold. If it is concluded that the project "is not likely to adversely affect" listed species, we should be asked to review the assessment and concur with the determination of not likely to adversely affect.

For those actions where a biological assessment is necessary, it should be completed within 180 days of receipt of a species list, but can be extended by mutual agreement between the lead agency and the Service. If the assessment is not initiated within 90 days of receipt of a species list, the list of threatened and endangered species should be verified with me prior to initiation of the assessment. The biological assessment may be undertaken as part of the agency's compliance of section 102 of the National Environment Policy Act (NEPA), and incorporated into the NEPA documents. The Service recommends that biological assessments include:

1. *a description of the project;*
2. *a description of the specific area potentially affected by the action;*
3. *the current status, habitat use, and behavior of threatened and endangered species in the project area;*
4. *discussion of the methods used to determine the information in item 3;*
5. *direct and indirect impacts of the project to threatened and endangered species, including impacts of interrelated and interdependent actions;*
6. *an analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts from Federal, State, or private projects in the area.*

7. *measures that will reduce or eliminate adverse impacts to threatened and endangered species;*
8. *the expected status of threatened and endangered species in the future (short and long term) during and after project completion;*
9. *determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species;*
10. *determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species;*
11. *alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed action, and the reasons for not selecting those alternatives;*
12. *citation of literature and personal contacts used in the assessment.*

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If the scope of the project is changed, or the project is modified, in a manner that you determine may affect a listed species, this office should be contacted to discuss consultation requirements pursuant to the Act. If you have further questions regarding our comments or your responsibilities under the Act, please contact Kathleen Erwin of my staff at the letterhead address or phone (307) 772-2374, extension 28.

Thank you for your comments.

References

Braun, C.E. 1998. Sage grouse declines in western North America: What are the problems? Proceedings of the Western Association of Fish and Wildlife Agencies 78:139-156

______.1987. Current issues in sage grouse management. Proc. West. Assoc. Fish and Wildlife Agencies 67:134-144

Connelly J. W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28(4): 967 -985.
Lyon; A.G. 2000. The potential effects of natural gas development on sage grouse (Centrocercus urophasianus) near Pinedale, Wyoming. Thesis, University of Wyoming, Laramie, USA

Department of Energy

The Western Area Power Administration (Western) is in receipt of your December 3,2002 Scoping Notice concerning the proposal by Burlington Resources Oil and Gas Company LP to drill additional wells in their Little Monument Unit located in sections 21 through 23 and 26 through 28, Township 25 North, Range 111 West, 6th Principal Meridian, Sweetwater County, Wyoming.

Western, as a Federal power marketing administration within the Department of Energy, has responsibility for the reliable and safe delivery of electricity throughout the western United States. It constructs, operates, maintains, and reconstructs transmission lines, substations, switch yards, communication sites, and the roads that provide access to them. Some of Western's facilities are located on Federal lands administered by the Bureau of Land Management within the State of Wyoming. No Western owned and/or operated facilities are located on the subject lands in Sweetwater County. A map of facilities within our Rocky Mountain Region, which includes Wyoming, is enclosed for your use.

Since we are not impacted by the proposed drilling of additional exploration and development oil and gas wells within the Little Monument Unit, we will be offering no comments on your Scoping Notice. You may remove Western from your mailing list for this effort.

> Thank you for your comments. The agency has been removed from the mailing list for this project.

Glade Jones

Three issues should be addressed.

1. *Seeing both the backs lope and ends lope of road ROWs seeded with native grass species.*
2. *See well pads reclaimed and seeded to the extent allowable for worker/public safety.*
3. *See oil/gas operators help fund vegetation improvement projects (i.e., mowing, chaining, chemical treatment) to improve grass ratio.*

> Thank you for your comments. They have been considered in the analysis.

Bjork, Lindley, Danielson & Little, P.C.

Please place my name on the mailing list to receive a copy of the environmental document which is being prepared on the Burlington Resources proposal to drill additional wells in the Little Monument Unit.

Oregon California Trail Association

Please provide a copy of the document to me when it is available.

Jean Dickenson

Please keep on mailing list.

> You remain on the mailing list for this project.

ENVIRONMENTAL ASSESSMENT

WYW-040-EA03-186

LITTLE MONUMENT NATURAL GAS PROJECT

Prepared for

Bureau of Land Management
Rock Springs Field Office
Rock Springs, Wyoming

This Environmental Analysis was prepared by *Gary Holsan Environmental Planning*, an environmental consulting firm, with the guidance, participation, and independent evaluation of the Bureau of Land Management (BLM). The BLM, in accordance with Federal regulation 40 CFR 1506.5(a) and (b), is in agreement with the findings of the analysis and approves and takes responsibility for the scope and content of this document.

January, 2004

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ABBREVIATIONS/ACRONYMS

ABBREVIATIONS/ACRONYMS

AADT	average annual daily traffic
ac	acres
ac-ft	acre feet
ac-ft/mi^2/yr	acre feet per square mile per year
ac-ft/yr	acre feet per year
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic
AML	Appropriate Management Level
analysis area	Copper Ridge Project Area
ANC	Acid Neutralizing Capacity
AO	authorized officer
APD	Application for Permit to Drill
AQD	Air Quality Division
AQRV	Air Quality Related Values
ARM	Ambient Ratio Method
ASTM	American Society for Testing Materials
AUM	Animal Unit Month
BA	Biological Assessment
BACT	Best Available Control Technology
BBCC	Black Butte Coal Company
bbl	barrel = 42 gallons
BLM	Bureau of Land Management
BTEX	Benzene, toluene, ethylbenzene, xylene
Burlington	Burlington Resources Oil and Gas Company LP
BWPD	barrel of water per day
CASTNet	Clean Air Status and Trends Network
CBM	Coal Bed Methane
CDPHE-APCD	Colorado Department of Public Health and Environment, Air Pollution Control Division
CD/WII	Continental Divide/ Wamsutter II
CEQ	Council for Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGF	Central gathering facility
CIA	cumulative impacts analysis
cm	centimeter
CO	carbon monoxide
COE	Corps of Engineers
CREG	Consensus Revenue Estimating Group
CRU	Copper Ridge Unit
CWA	Clean Water Act
CWYL	Crucial Winter/Yearlong
dBA	decibel, A-weighted scale
DEIS	Draft EIS
DEQ	Department of Environmental Quality
dia.	Diameter
DOI	US Department of Interior
dv	deciview
EA	environmental assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency

ABBREVIATIONS/ACRONYMS

ESA	Endangered Species Act of 1973
F	Fahrenheit
FAA	USDT Federal Aviation Administration
FEMA	Federal Emergency Management Act
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
FLPMA	Federal Land Policy and Management Act
FR	Federal Register
Frac	Fracture Stimulation
FS	Forest Service
ft	foot (or feet)
FWS	U.S. Fish and Wildlife Service
FY	Fiscal Year
GAP	Wyoming Gap Analysis Program
g/hp-hr	grams per horsepower-hour
GLO	General Land Office
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
GRRA	Green River Resource Area (now RSFO Area)
GRRMP	Green River Resource Management Plan
HAP	Hazardous Air Pollutants
HDPE	High density polyethylene
HMA	herd management area
HNO_3	nitric acid
hp	horsepower
H_2S	hydrogen sulfide
HWA	Hayden-Wing Associates
I-80	Interstate 80
IAA	Impact Analysis Area
ID	interdisciplinary
IDT	interdisciplinary team
IMPROVE	Interagency Monitoring of PROtected Visual Environments
in	inches
kg	kilograms
kg/ha	kilograms per hectare
km	kilometer
LAC	level of acceptable change
LMPA	Little Monument Project Area
LOP	Life of Project
m	meter
MCF	thousand cubic feet
mcfd	thousand cubic feed per day
mcfgpd	thousand cubic feet of gas per day
mg/l	milligrams per liter
mm	millimeter
MLE	Most Likely Exposure
MMCFD	million cubic feet per day
mph	miles per hour
MSDS	Material Safety Data Sheet
MSHA	Mine Saftey Hazard Administration
N_2	Nitrogen
NA	not applicable
NAAQS	National Ambient Air Quality Standards

ABBREVIATIONS/ACRONYMS

NADP	National Atmospheric Deposition Program
n.d.	no date
NEPA	National Environmental Policy Act
NEIC	National Economic Information Center
NH_4	Ammonia
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NO_x	oxides of nitrogen
NO_2	nitrogen dioxide
NO_3^-	nitrate
NOS	Notice of Staking
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSI	no significant impacts
NSR	New Source Review
NTL	Notice to Lessee
NTU	Nephelometric Turbidity Unit
NWS	National Weather Service
NWI	National Wetlands Inventory
O_3	ozone
OSHA	Occupational Safety and Health Administration
P&A'd	plugged and abandoned
PA	Proposed Action
PC	progressive cavity
pH	acidity measurement unit (negative logarithm of the hydrogen ion [H^+] concentration)
PEMC	Palustrine, emergent, seasonally flooded
PFO	Pinedale Field Office
PI	Petroleum Information, Inc.
PIC	Planning Information Corporation
$PM_{2.5}$	particulate matter less than 2.5 microns in effective diameter
PM_{10}	particulate matter less than 10 microns in effective diameter
POD	Plan of Development
PSD	Prevention of Significant Deterioration
PPP	pollution prevention plan
PUBFx	Palustrine, unconsolidated bottom, semi-permanently flooded, excavated
PUP	Pesticide Use Proposal
PUSAh	Palustrine, unconsolidated shore, temporarily flooded, diked/impounded,
PUSCh	Palustrine, unconsolidated shore, seasonally flooded, diked/impounded
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RFFAs	reasonably foreseeable future actions
RFD	reasonably foreseeable development
RMP	Resource Management Plan
RMOGA	Rocky Mountain Oil & Gas Association
ROD	Record of Decision
ROW	Right-of-Way
RSGA	Rock Springs Grazing Association
RSFO	Rock Springs Field Office
RV	recreational vehicle
SAR	Sodium Absorption Ratio
SARA	Superfund Amendments and Reauthorization Act
scf	standard cubic feet

ABBREVIATIONS/ACRONYMS

SCS	Soil Conservation Service
SCEMA	Sweetwater County Emergency Management Agency
SEO	Wyoming State Engineer's Office
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SOW	State of Wyoming
SPCC	Spill Prevention Control and Countermeasures
SSF	spring summer fall
SWPPP	storm water pollution prevention plan
TCF	trillion cubic feet
TDS	total dissolved solids
Thalweg	The line defining the lowest points along the length of a river bed or valley
TPQ	threshold planning quantity
TSS	Total Suspended Solids
UAD	unquantified additional development
UGMA	upland game management area
UND	Undetermined
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
US DOE EIA	US Department of Energy Energy Information Administration
USFS	US Forest Service
USGS	United States Geological Survey
UW	University of Wyoming
VOC	Volatile Organic Compounds
VRM	Visual Resource Management
w/	with
w/i	within
w/o	without
WAAQS	Wyoming Ambient Air Quality Standards
WAS	Western Archaeological Services
WDAI	Wyoming Department of Administration and Information
WDE	Wyoming Department of Employment
WDEQ-AQD	Wyoming Department of Environmental Quality, Air Quality Division
WGFD	Wyoming Game and Fish Department
WOGCC	Wyoming Oil and Gas Conservation Commission
WOS	Wildlife Observation System
WQD	Water Quality Division
WRDS	Wyoming Water Resources Data System
WSGS	Wyoming State Geological Survey
WTA	Wyoming Taxpayers Association
WYDOT	Wyoming Department of Transportation
WYGISC	Wyoming Geographic Information Science Center
WYL	Winter/Yearlong
WYNDD	Wyoming Natural Diversity Database
WYO 372	Wyoming Highway 372
YBP	years before present
YRL	Yearlong
μeq/l	microequivalents per liter
μg/m^3	micrograms per cubic meter
°F	degrees Fahrenheit
Δ	difference (delta)

CHAPTER 1

INTRODUCTION

CHAPTER 1

PURPOSE AND NEED

1.0 PURPOSE AND NEED FOR ACTION

Burlington Resources Oil and Gas Company LP (Burlington) has notified the Bureau of Land Management (BLM), Rock Springs Field Office (RSFO) that the company intends to drill additional exploration and development wells in the Little Monument Project Area (LMPA) located in Sections 21 through 23, and 26 through 28, Township 25 North and Range 111 West, 6th Principal Meridian, Sweetwater County, Wyoming (Figure 1-1). The project area includes approximately 3,857 acres. All surface and mineral rights are on public lands managed by the BLM. The proposed development wells, access roads, pipelines, and other ancillary facilities would be permitted with the BLM and the Wyoming Oil and Gas Conservation Commission (WOGCC). The Little Monument Project Area presently contains 31 producing natural gas wells, 2 plugged and abandoned wells, and 1 temporarily abandoned wellbore.

The project area is located approximately 12.5 miles south, southeast of LaBarge, Wyoming. Access to the project area is via US Highway 189 south of LaBarge, east on Delany Canyon (all weather road) to County Line Road (all weather road). The location of the proposed project area is within a well-developed oil and gas field.

Burlington proposes to develop the natural gas resources in the project area by increasing the number of wells and ancillary facilities where economically feasible. This proposal would increase the recovery of natural gas from the project area allowing Burlington to supply more of the resource to distribution companies for marketing to the end users.

Exploration and production of federal oil and gas leases by private industry is an integral part of the BLM's oil and gas policy. The BLM oil and gas program encourages development of domestic oil and gas reserves, as expressed in a variety of laws passed by Congress. Natural gas development is an integral part of the United States' energy future, and part of our current national energy policy. Production of reliable domestic natural gas will strengthen the United States' energy future by decreasing the reliance on foreign supplies.

The purpose and need for the proposed natural gas development project is to exercise the lease holders' rights within the project area to drill, complete, and operate additional natural gas wells, subject to applicable laws and stipulations of the lease. Also included is the right of Burlington to construct, operate, and maintain necessary ancillary facilities, subject to renewal or extension of the lease(s) subject to appropriate authority. The Mineral Leasing Act, as amended, mandates oil and gas lessees to conduct operations in a manner that results in the maximum ultimate economic recovery of the federal resource with minimum waste (43 CFR 3160-5 and 3161.2). The proposal is designed to achieve this regulatory requirement utilizing the most economical means possible.

1.1 PROJECT DESCRIPTION

Burlington proposes to drill, complete, and produce approximately 31 additional wells at 8 or more wells per section within the LMPA over the next 3 years. Drilling operations are proposed

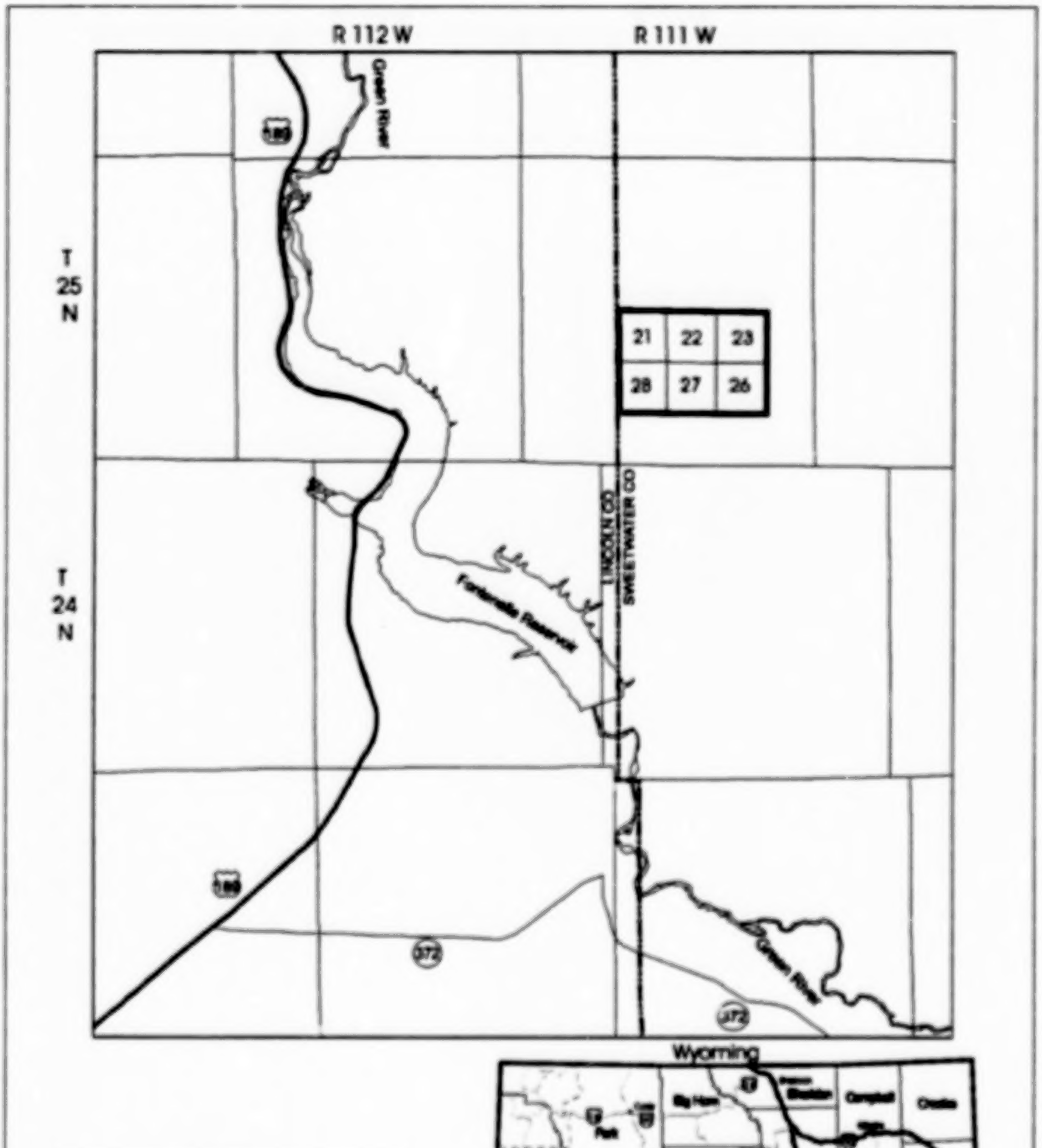

Figure 1-1. Location of the Little Monument Natural Gas Project, Sweetwater County Wyoming.

to begin once regulatory permits are secured, and would continue over the next 3 years depending on the success of the drilling program. In addition to wellpads and associated construction, Burlington anticipates that additional infrastructure such as access roads and pipeline would be necessary to further develop the resource. Additional gas volumes would be transported via existing trunk pipelines, but additional gathering pipelines are anticipated should drilling prove successful.

The LMPA lies within the Lincoln Road Project area that was previously studied for oil and gas development in the Fontenelle Natural Gas Infill Drilling Projects Environmental Impact Statement (EIS) (USDI-BLM 1995), which analyzed for a well density of 4 to 8 wells per section (80 to 160 acre spacing).

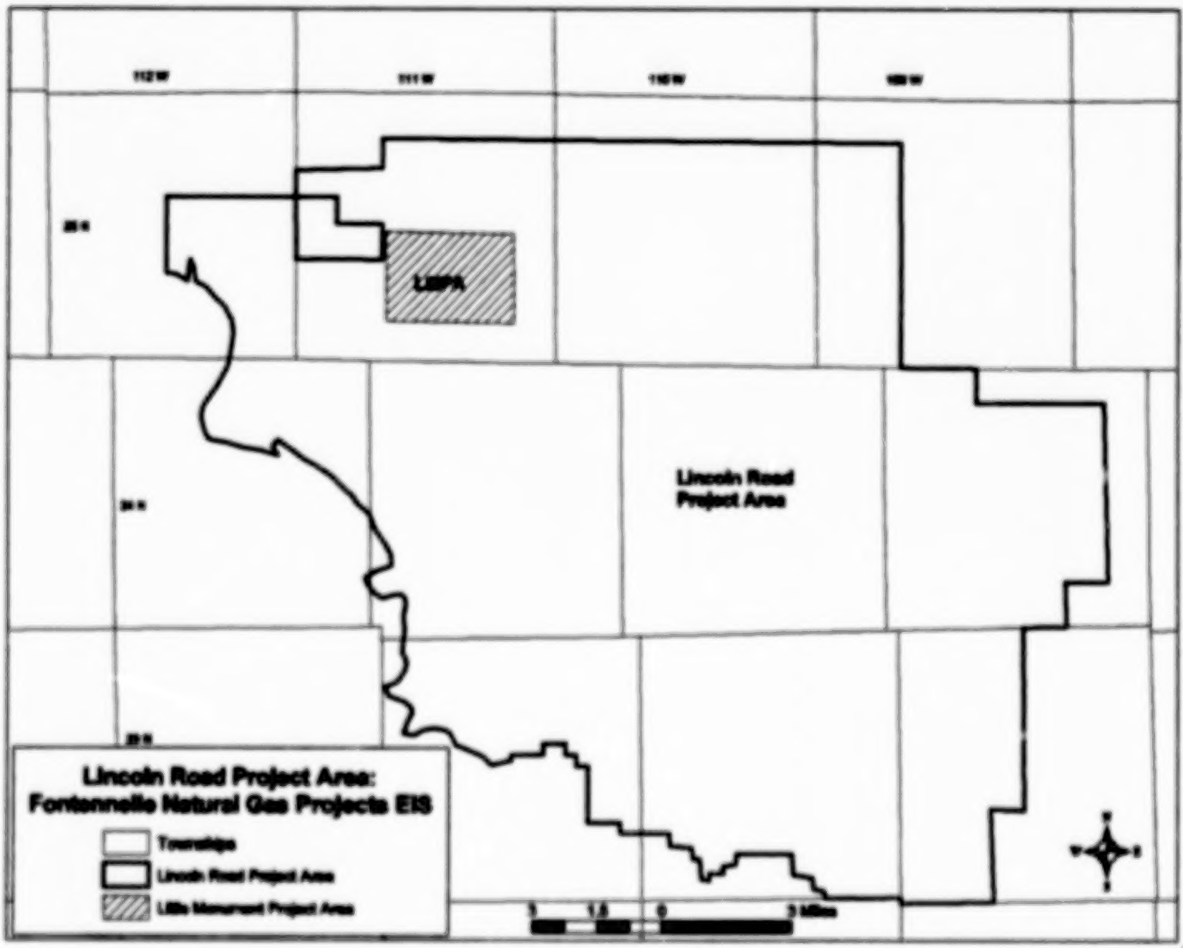
112 W
111 W
110 W
109 W
LMPA
Lincoln Road
Project Area
Lincoln Road Project Area:
Fontennelle Natural Gas Projects EIS
Townships
Lincoln Road Project Area
Little Monument Project Area
3 1.5 0 3 Miles
N
W
E
S

Figure 1-2. Lincoln Road Project Area.

1.2 RELATIONSHIP TO EXISTING PLANS AND DOCUMENTS

Resource Management Plan - The document, which directs management of public lands administered by the BLM within the RSFO, is the approved Resource Management Plan (RMP) for the Green River Resource Area (now the RSFO, USDI-BLM 1997). The objective for management of oil and gas resources, as stated in the RMP, is to provide for leasing, exploration, and development of oil and gas while protecting other resource values.

The development of natural gas within the Little Monument Project Area is in conformance with the RMP. The environmental analysis prepared for the proposed additional wells in the LMPA incorporates decisions, terms, and conditions of use as described in the RMP.

Use Authorizations - Use authorizations (i.e., rights-of-way, permits, etc.) for roads, pipelines, and well site facilities would be processed through the BLM Application for Permit to Drill (APD), Sundry Notice, or Right-of-Way (ROW) permitting process.

Lease Stipulations - Some federal oil and gas leases within the proposed area may include special stipulations on occupancy. These stipulations are in addition to the standard lease terms and are designed to protect surface resources such as soils, water, and wildlife by restricting periods of activity or areas of disturbance. Application of these lease stipulations would be handled on a case-by-case basis for each APD submitted to the BLM.

Amended Record of Decision for Fontenelle Natural Gas Infill Drilling Projects/EIS – The Little Monument Project Area lies within the Lincoln Road project area analyzed in the aforementioned EIS. The amended Record of Decision (ROD) approved 1,095 wells (780 on BLM-administered public lands and 315 wells on public lands managed by the Bureau of Reclamation) within the Lincoln Road project area beyond the 287 existing wells producing at the time. To date, there are 418 producing wells within the townships overlapping the Lincoln Road Project area.

The EIS noted 95 wells drilled (72 wells producing) within T. 25 N., R. 111 W., and the decision approved an additional 158 wells within the township for a total of 253 wells (95 wells drilled + 158 new wells). To date, there are 139 producing wells in this township. The addition of 31 wells within this township is well within the scope of the analysis prepared for the Lincoln Road project area of the Fontenelle Natural Gas Infill Drilling Projects EIS.

Burlington's proposal is within the 1,095 wells approved in the amended ROD. However, to fully develop the federal mineral estate, Burlington has found it necessary to propose some wells at a spacing of less than the 80 acres analyzed in the EIS within the LMPA. The LMPA is outside of "Sensitive Resource Value Protection Areas" (e.g., wetlands, crucial winter range, raptor and greater sage-grouse nesting, etc.) identified in Appendix D of the amended ROD. No new issues have been identified for the lands affected by the proposal; thus, this project remains well within the threshold of impacts stated in the analysis. The analysis prepared for Burlington's proposal incorporates and tiers to the Fontenelle Natural Gas Infill Drilling Projects EIS.

Pinedale Anticline Oil and Gas Exploration and Development Record of Decision (July 2000) - The air quality analysis conducted for the Pinedale Anticline EIS updates the Green River (RSFO), Pinedale, and Kemmerer RMPs and southwest Wyoming air quality evaluation on a cumulative basis for the region. Project components from the Fontenelle project were factored into the air quality analysis. Although the Proposed Action proposes compression, it would be

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powered by electricity; thus, emissions from the additional compression would not add to the existing situation.

The Decision Record, Finding of No Significant Impact, Changes to Modification/Corrections to the Environmental Assessment for the Vermillion Basin Natural Gas Exploration and Development Project (USDI, 2002), Appendix D which analyzed directional and horizontal drilling techniques in the Frontier formation. Appendix D can be access via the internet at http://www.wy.blm.gov/nepa/rsfodocs/vermbasin/VBPA-well-architecture-letter.pdf.

1.3 NATIONAL ENVIRONMENTAL POLICY ACT

The proposed project has been analyzed in accordance with the requirements of the National Environmental Policy Act (NEPA). To comply with NEPA and the Council on Environmental Quality regulations, which implement NEPA, the BLM was required to prepare an environmental analysis. This environmental assessment (EA) serves several purposes:

- it provides the public and government agencies with information about the potential environmental consequences of the proposed project and alternatives;
- it identifies all practicable means to avoid or minimize environmental harm from the project and alternatives; and
- it provides the responsible official with information upon which to make an informed decision regarding the project.

NEPA requires Federal agencies to use a systematic, interdisciplinary approach to ensure the integrated use of natural and social sciences in planning and decision making. Factors considered during the environmental analysis process regarding the Burlington project include the following:

- a determination of whether the proposal and alternatives are in conformance with BLM policies, regulations, and approved resource management plan direction; and
- a determination of whether the proposal and alternatives are in conformance with policies and regulations of other agencies likely associated with the project.

This EA is not a decision document. It documents the process used to analyze the potential impacts of the proposed action and alternatives, and discloses the effects of the proposed action and alternatives to that action. A Decision Record (DR), signed by the responsible official (Assistant Field Manager for Lands and Minerals, BLM, RSFO) will document the final decision regarding the selected alternative. The BLM will document whether or not significant impacts would occur with implementation of any of the alternatives. If the BLM determines that no significant impacts would occur, a Finding of No Significant Impact (FONSI) and Decision Record would be issued. If significant impacts are identified, the BLM decision would be to complete an Environmental Impact Statement (EIS), with subsequent public input and additional analysis of the alternatives. The BLM decision will relate to BLM administered lands. Decisions by the responsible official regarding the use of transportation networks in the project area by Burlington may affect private landowners, county administration of these roads, and public access to BLM administered lands.

1.4 AUTHORIZING ACTIONS

The proposed federal, state, county, and local actions required to implement the Little Monument Natural Gas Project are listed in Table 1-1.

Table 1-1. Federal, State, and County Authorizing Actions.

AGENCY	NATURE OF ACTION
DEPARTMENT OF THE INTERIOR	
Bureau of Land Management (Rock Springs Field Offices	NEPA compliance and approval of ROW applications for pipelines; temporary use permits; approval of APD's and Sundry Notices.
U.S. Fish and Wildlife Service	Coordination, consultation, and impact review on federally listed or proposed for listing, threatened or endangered species of fish, wildlife, and plants. Migratory bird impact coordination.
U.S. ENVIRONMENTAL PROTECTION AGENCY	
	Spill Prevention Control and Countermeasures (SPCC) Plans. Regulate hazardous waste treatment, storage, and /or disposal.
DEPARTMENT OF THE ARMY	
U.S. Army Corps of Engineers	Issue permits(s) (Section 404) for placement of dredged or fill material in or excavation of waters of the U.S. and their adjacent wetlands.

Table 1-1. Federal, State, and County Authorizing Actions. (cont.)

AGENCY	NATURE OF ACTION
WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY	
Water Quality Division	National Pollution Discharge Elimination System (NPDES) permits for discharging waste water and storm water runoff. Conformance with all surface water standards; permit to construct and permit to operate. Permits to construct settling ponds and waste water systems, including ground water injection and disposal wells. Regulate disposal of drilling fluids from abandoned reserve pits. Administrative approval for discharge of hydrostatic test water.
Air Quality Division	New Source Review (NSR) Permit: All pollution emission sources, including compressor engines and portable diesel and gas generators. Conformance with all ambient air quality standards.
WYOMING STATE ENGINEERS OFFICE	
	Issue permits to appropriate groundwater and surface water. Issue temporary water rights for construction permits to appropriate surface water.
WYOMING STATE HISTORIC PRESERVATION OFFICE	
	Consultation concerning identification, evaluation, assessments effect and treatment of adverse effects on historic properties.

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Table 1-1. Federal, State, and County Authorizing Actions. (cont.)

AGENCY	NATURE OF ACTION
SWEETWATER COUNTY	
	Zoning certificates for site development and construction. Small wastewater system permits, where applicable. Road use agreements and/or oversize trip permits when traffic on county roads exceeds established size and weight limits or where the potential for excessive road damage exists. Construction and conditional use permits for all new structures. Zoning changes where applicable. Control of noxious weeds. Permits to bore or trench county roads or for any crossing or access off a county road.
WYOMING DEPARTMENT OF TRANSPORTATION	
	Conformance with applicable size and weight limits for trucks.
WYOMING OIL AND GAS CONSERVATION COMMISSION	
	Primary authority for drilling on state and privately held mineral resources and secondary authority for drilling on federal lands. Authority to allow or prohibit flaring or venting of gas on private or state owned minerals Regulate drilling and plugging of wells operating on private or state owned minerals. Aquifer Exemption Permit. Directional drilling. Rules and regulations governing drilling units. Gas injection well permits.

1.5 LAND AND RESOURCE MANAGEMENT ISSUES AND CONCERNS

In accordance with NEPA and Council of Environmental Quality (CEQ) regulations, the RSFO released a public scoping notice on December 3, 2002 for a 30-day review period. Ten comment letters were received. The scoping process led to the identification of the following land and resource management issues and concerns associated with the proposed action:

- potential increased traffic and associated impacts on existing county, state, and BLM roads;
- potential socio-economic impacts to local communities;
- potential impacts to surface and groundwater resources, including sedimentation/salinity to the Colorado River system;
- potential impacts to sensitive soils within the project area;
- potential impacts from emissions resulting from additional drilling and production activities, including dust emissions;
- potential impacts related to reclamation of disturbed areas and control of noxious weed invasions;
- potential conflicts with livestock management operations in the analysis area, including possible impacts to range improvement projects;
- potential impacts to cultural and historical values within the analysis area;
- potential impacts to wildlife habitats, especially habitat fragmentation, within the analysis area, including big game, greater sage-grouse, and raptors;
- potential impacts to listed, or proposed for listing, threatened and endangered plant and animal species, including potential Colorado River depletion and effects on downstream listed fish species;
- potential cumulative effects of drilling and development activities when combined with other ongoing and proposed developments on lands adjacent to the Little Monument Unit;
- application and acquisition of appropriate permits; and
- potential disturbance to riparian canopy or stabilizing vegetation.

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

2.0 SUMMARY

The Little Monument Project Area (LMPA) is located in an existing oil and gas production area most recently developed as Little Monument II. Since 1978, a total of 31 producing wells have been drilled and developed in sections 21, 22, 23, 26, 27, and 28, Township 25 North, Range 111 West, 6th Principal Meridian, Sweetwater County, Wyoming. Two additional, non-producing wells have been plugged, abandoned, and reclaimed, and one wellbore has been temporarily abandoned. Burlington proposes to drill a maximum of 31 wells at 8 or more wells per section within the aforementioned sections. The total project area encompasses 3,857 acres, all of which are federal surface and minerals.

The Proposed Action assumes the construction of 31 wells and associated roads and pipelines. The LMPA would have approximately 55.8 acres of new surface disturbance associated with well locations and approximately 35.6 acres of total site disturbance associated with road and pipeline construction. Total new short-term surface disturbance resulting from the Proposed Action would be 91.4 acres (approximately 2.4 percent of the LMPA). During the life-of-project (LOP), 15-20 years, total disturbances would be reduced to approximately 40 acres (31.0 acres associated with 31 wells having 1.0 acre of remaining disturbance per well site, and 9 acres of roads) or approximately 1.0 percent of the 3,857-acre LMPA (Table 2-1).

Table 2-1. Approximate Acreage of Proposed Surface Disturbance, Little Monument Natural Gas Project.

Land Disturbance Summary Little Monument Project Area		
Project Component	**Initial Disturbance Acres**	**Life-of-Project Disturbance Acres**
Well Pads	55.8	31.0
Roads and Pipelines	17.8	9.0
Pipelines	17.8	0.0
Total	**91.4**	**40.0**

CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

2.1 ALTERNATIVE SELECTION PROCESS

2.1.1 Proposed Action

The Proposed Action of drilling and developing approximately 31 natural gas wells in addition to existing drilling and production operations was determined by summarizing drilling plans projected by Burlington over the next three-year planning period. Drilling estimations were based on reasonably foreseeable spacing and drilling projections into areas within the project area where the planned production and development activities would occur.

Additionally, the Proposed Action of drilling and developing approximately 31 natural gas wells was determined by Burlington as the minimum number of wells needed to properly define the gas resource. The wells are conventional natural gas projected to be drilled to a depth of approximately 9,500 feet. Drilling would take place once appropriate permits are acquired and continue for the subsequent three years, with a life-of-project estimated at 15 to 20 years. The Proposed Action is discussed in detail in Section 2.2 of this EA.

2.1.2 Alternatives to the Proposed Action

2.1.2.1 Alternative A – No Action

For this project, the No Acton Alternative is denial of the drilling and development proposal as submitted by Burlington. However, the Department of the Interior's authority to implement an alternative which precludes drilling by denying the project is limited.

The Record of Decision for the Fontenelle Natural Gas Infill Drilling Projects (USDI, BLM 1997) permits 780 wells on BLM administered lands within the Lincoln Road Project Area, which includes the LMPA. To date, 418 wells are producing within the townships overlapping the Lincoln Road Project area. (WOGCC, 2003 http://wogcc.state.wy.us/FieldMenu.cfm?Skip='Y'&oops=ID13352). The Fontenelle ROD permits drilling on 80 acre spacing, while Burlington's proposed action requests drilling on less than 80 acre spacing.

The No Action Alternative for this EA would be denial of the proposal in excess of the level of development allowed by the Fontenelle ROD, particularly with regard to well spacing. Transport of natural gas products would be allowed from those wells within the project area that are currently productive.

2.2 PROPOSED ACTION – DRILL AND DEVELOP 31 NATURAL GAS WELLS WITHIN THE LITTLE MONUMENT PROJECT AREA

2.2.1 Preconstruction Planning and Site Layout

Burlington would follow the procedures outlined below to gain approval for the proposed activity on public lands within the LMPA.

- Prior to the start of construction activities, Burlington would submit a Notice of Staking (NOS), APD, or ROW application to the BLM with a map showing the specific location of the proposed activity. Burlington and BLM would conduct an on-site evaluation during which site specific requirements would be identified and discussed. Following the on-

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site evaluation, Burlington would file the application which would include site-specific construction plans where necessary to describe the proposed development.

- The proposed facility would be staked by Burlington and inspected by representatives of the BLM to ensure consistency with plans in the APD/Sundry Notice/ROW Application.
- Should discrepancies in the application be found, Burlington would revise the application as necessary. The BLM would then grant an authorization with the appropriate Conditions of Approval. The applicant then has one year within which to commence the proposed activity.
- Prior to approval, Burlington must have cleared the proposed construction area for cultural values, special status plants and animals, paleontological values, nesting raptors, greater sage-grouse, etc. If any of these resources are found, appropriate mitigation would be applied.

2.2.2 Construction and Drilling Phase

2.2.2.1 Road Construction

Highway access to the LMPA from Rock Springs and Green River is provided by Wyoming State Highway 372 (WYO 372), a two-lane, paved secondary highway which travels 38 miles northwest from I-80 to Fontenelle and another 11 miles west to its intersection with US 189 about 24 miles northeast of Kemmerer. Refer to Figure 3-12 (Chapter 3, Affected Environment) for a road map of the area.

Access to the Project Area from Kemmerer/Diamondville is provided by US 189 and WYO 372. Access from Big Piney/Marbleton is also provided by US 189, a paved, two-lane, primary highway, connecting US Interstate 80 on the south with Hoback Junction to the north, passing through Diamondville, Kemmerer, La Barge, Big Piney, Marbleton and Daniel.

New development would likely require additional access roads to be constructed. Burlington proposes to construct the new roads to meet the standards of BLM Manual Section 9113 as necessary to access the newly developed production facilities. Figure 2-1 shows a typical roadway section as Burlington would construct it.

Burlington estimates that each new well would require an average of approximately 500 feet of new or upgraded road construction, along with an average of 500 feet of flow pipeline. Where possible, flow pipeline would be routed in new roadway ROW's to minimize surface disturbance.

Construction equipment and techniques utilized by Burlington would be standard (e.g., crown-and-ditch method). Surfacing and base course materials would be obtained from local operating gravel pits. Respreading of topsoil and windrowed vegetation to the sideslopes of newly constructed access roads and revegetation would begin the first appropriate season following the well going on production. The access road to an unproductive well site would be reclaimed at the same time the well is abandoned.

Manpower and equipment during road and well pad construction would vary according to conditions encountered, but an average complement would be eight equipment operators with two each dozers, motorgraders (with haul truck), and excavators (with haul truck). Several gravel trucks with operators would be utilized as needed.

2.2.2.2 Well Pad Design and Construction

Burlington proposes to utilize the traditional single-well pad design under the Proposed Action (Figure 2-2). The well pad size is estimated to be approximately 1.8 acres per well. Only those areas necessary to conduct drilling and completion operations would be cleared of vegetation. Total disturbance for the 31 well drilling program proposed would be approximately 55.8 acres.

All available topsoil suitable for reclamation would be stripped from the well pad area and stored on the periphery of the pad. Well pad construction and related facilities would normally take 4 to 6 days to complete, depending on local conditions.

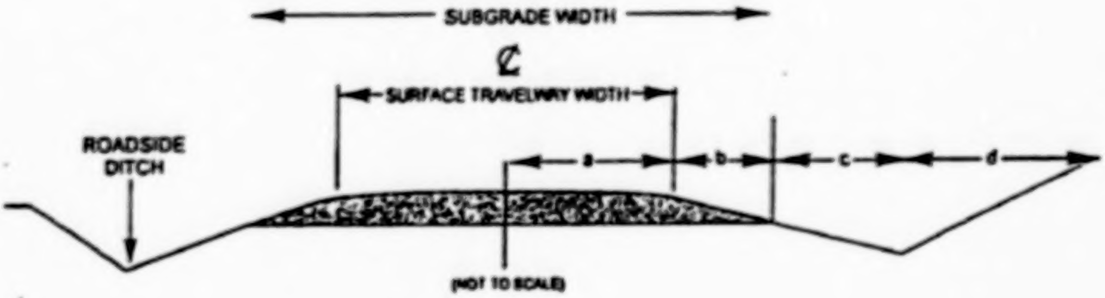
Components of the well pad include construction of a reserve pit to temporarily store drilling fluids, cuttings, and water produced during drilling, and a flare pit for emergency and development flaring. The reserve pit would be approximately 75 feet wide by 125 feet long by 10 feet deep, with a capacity of 8,760 barrels (367,900 gallons). Burlington proposes to use lined reserve pits at all drill site locations. Liners would be of sufficient strength and thickness to withstand normal installation and pit use. Construction details would be utilized to minimize possibility of damage to the liner. All reserve pits would be fenced to minimize the potential loss of wildlife and domestic animals.

Any hydrocarbons floating on the surface of the reserve pit would be removed as soon as possible after drilling operations are complete. Reserve pit fluids would be allowed to dry by evaporation for approximately one year prior to reserve pit closure and drill site reclamation. When the pit is backfilled, cuttings and drilling muds would be covered to a depth of at least three feet.

2.2.2.3 Drilling Operations

Each drilling operation would require transport of approximately 25 truckloads of drilling-related equipment and materials to facilitate the drilling operation. This includes transportation of the drill rig, drill pipe, drilling fluid products, and related support equipment, but does not include the truck traffic required for resupplying the operation (e.g. fuel, drilling fluid additives, etc.). Additional traffic would be variable, depending on the phases of the drilling operation, but should not exceed six or seven vehicles per day per drill site throughout the drilling season. Total rig-up activities and installation of ancillary facilities would take approximately three days to complete.

Because this is a conventional gas project, approximately 10 days would be required to drill, log, and run casing for each well. Approximately nine additional days would be required for completion, including perforating, fracing, and flowback. Drilling depths would vary within the project area between approximately 9,000 feet and 11,000 feet. Water for drilling purposes would be obtained from three existing water source wells located within the Little Monument Unit. Drill water requirements for wells in the LMPA average approximately 3,500 barrels (147,000 gallons or 0.45 acre feet) per well. Dust control water would average approximately 1,000 barrels (42,000 gallons or 0.13 acre feet) per well.



	Minimum Subgrade Width (ft.)	Minimum Surfaced Travelway Width (ft)	a (ft)	b (ft)	c (ft)	d (ft)	Approximate Disturbance Width (ft)	Total ROW Width (ft)	Design Speed (mph)
Resource Road	16	12	6	2	4	8	40	50	15-30
Local Road	24	20	10	2	4	8	48	55	20-50
Collector Road	28	24	12	2	4	8	52	60	30-50

DIAGRAM OF TYPICAL TURNOUTS ON RESOURCE ROADS (PLAN VIEW)

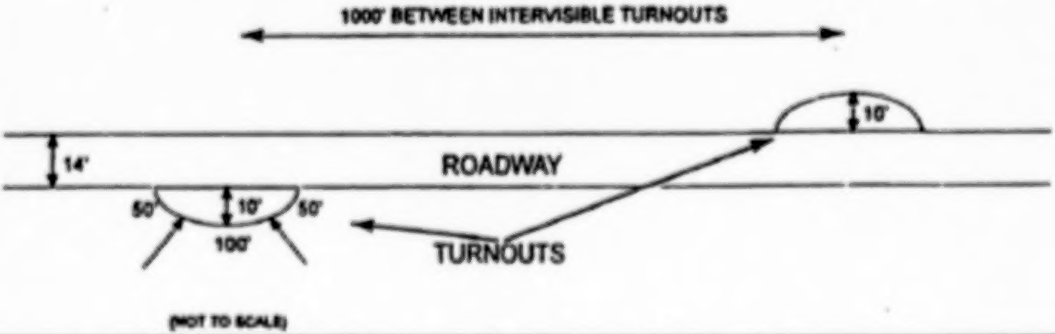


Figure 2-1. Typical Roadway Cross-Section with Width Specifications.

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Each well would be designed with a 4-inch gas discharge line. A separator and dehydrator would be placed at each well location along with metering equipment.

2.2.2.4 Pipeline Construction

Following drilling and completion, flowlines and gathering facilities would be installed for successful wells. Flowlines would be 3.5 inch O.D. or 4.5 inch O.D. steel pipe depending on pressure and volume requirements. Pipelines would be installed underground at a minimum depth of 2.0 feet. A ROW, 50 feet wide, is anticipated for flowlines. However, where possible, flowlines would be combined with access roads or existing pipelines to minimize disturbance. Flowlines would be hydrotested with fresh water during warmer weather to prove integrity. Water would be obtained from the Green River at the one lane bridge below Fontenelle on Lincoln County Road 311.

The gas produced within the LMPA would be transported by both new and existing pipelines and new and existing gathering lines. The operator would parallel existing roads, pipelines and gathering lines whenever feasible.

2.2.2.5 Natural Gas Production

All access roads to productive well sites would be maintained for well servicing activities if drilling is productive. Reclamation would be completed on segments of the well pad and access road ROW no longer needed. Well completion operations consist of the placement and cementing of well casing and perforation, stimulation and testing of potentially productive zones. Perforation, stimulation and testing requires large equipment to be transported and utilized at the well site, and flaring of the initial produced gas.

A typical cased well bore consists of conductor pipe, surface casing, and production casing. Surface casing is set deep enough and cemented to the surface to protect freshwater aquifers. Surface casing is set at the beginning of drilling operations. Setting production casing and cementing it in place is designed to prevent gas, oil, condensate, or water from migrating from formation to formation and to isolate producing zones.

Production operations would occur year-round, requiring the use of access roads in the project area on a year-round basis. Access roads would be maintained as necessary by gravelling in spring or fall and plowing snow during winter months.

Cut and fill slopes associated with each production well site would be reclaimed as prescribed in the APD. Each producing well would be serviced by its own production facility, unless consolidation of production facilities for closely spaced wells is technically and economically feasible.

2.2.2.6 Estimated Employment Requirements

The estimated numbers of persons employed in various phases of the pre-drilling, construction, drilling, completion/testing, and producing well services including pipeline construction are shown in Table 2-2. It should be noted that many of the personnel employed on different phases of the well development are not full-time employees, but short term skilled or craft workers. In most cases, the length of time for each activity is indicated in addition to the

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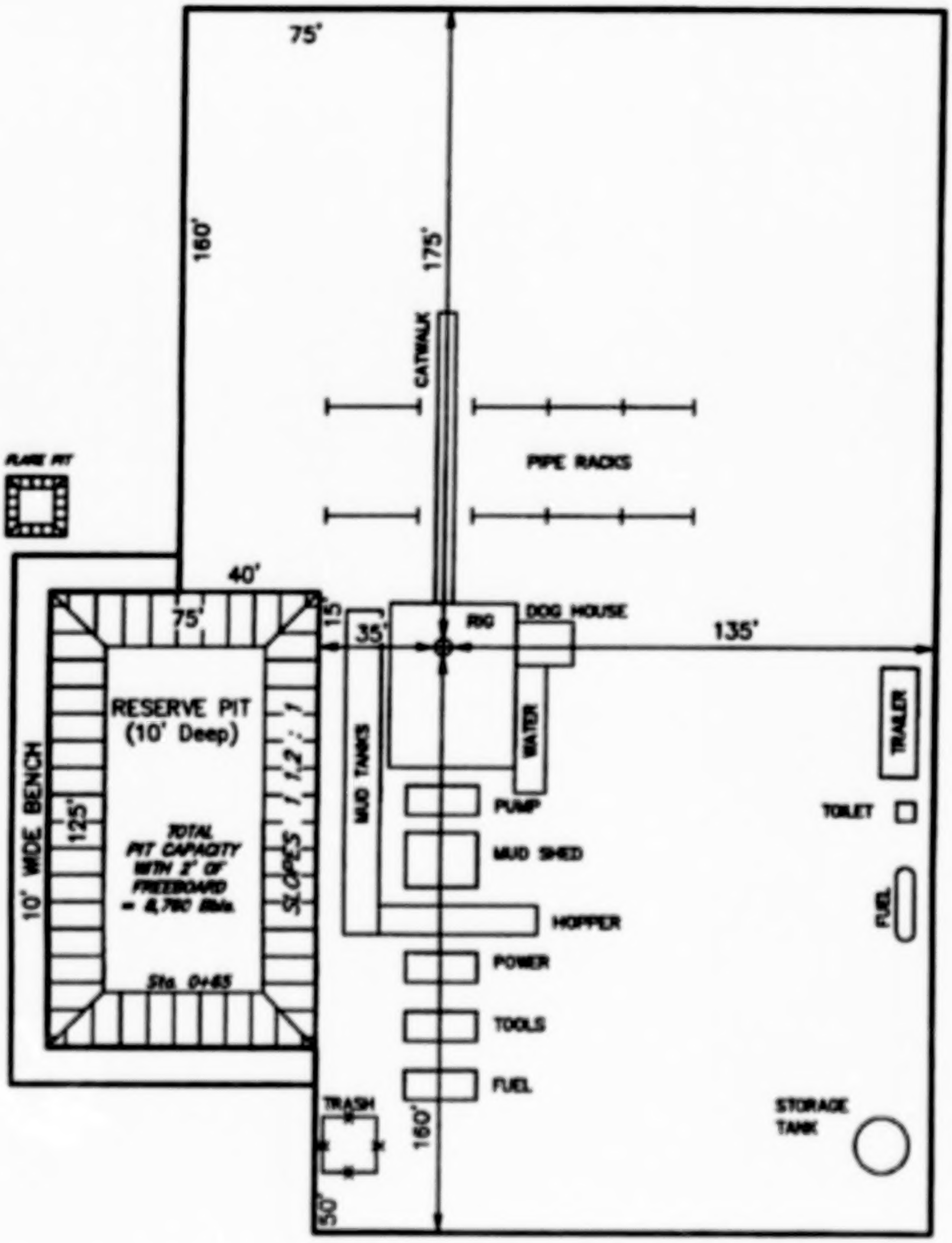

Figure 2-2. Typical Drill Rig Layout

expected time on site for the different activities involved in field development. In addition, Table 2-3 shows trip estimates for well development activities.

2.2.2.7 Ancillary Facilities

Burlington would construct ancillary facilities as necessary to meet production needs. Such facilities may include, but not be limited to: (1) individual well site liquids recovery units, (2) gas metering stations, (3) pipeline pigging facilities, (4) field storage buildings, and (5) cathodic protection facilities. The number and location of such ancillary facilities is unknown at this time, but most would be installed within the boundaries of existing disturbances.

Additional compression may be required to transport some of the new production, but Burlington in not anticipating any for this Proposed Action. If any compression is required, it would be analyzed with an action for pipeline or other transportation system.

2.2.2.8 Site Restoration and Abandonment

Burlington proposes to completely reclaim all disturbed areas not needed for production activities including pipeline ROW's, portion of road ROW's not needed in the function of the road, and the portion of the drill pad not needed during production. In addition, Burlington would reclaim unneeded and illegal "short-cut" roads in the LMPA once the new access roads are complete. Drill pads are reclaimed such that an estimated one acre of disturbance remains per pad. Reclamation would generally include: (1) cleanup of the disturbed areas; (2) restoration of the disturbed areas approximately to the original grade; (3) ripping the disturbed area to a depth of 12 to 18 inches; (4) replacement of topsoil over all disturbed areas; (5) seeding of reclaimed areas with the seed mixture prescribed in by the BLM; and (6) fertilizing and mulching, if considered necessary by the BLM's authorized officer (AO).

The final set of reclamation measures to be applied would be developed in the APD or ROW grant by the operator in consultation with the BLM and would be specific to each site.

2.2.2.9 Applicant-committed Practices

2.2.2.9.1 Cultural Resources

Class III surveys would be completed on areas proposed for surface disturbance prior to initiation of the disturbance, and reports would be submitted to the BLM, RSFO. Burlington and contractors would inform their employees about relevant federal regulations protecting cultural resources. If any cultural remains, monument sites, objects, or antiquities, subject to the *Antiquities Act of June 8, 1906* or the *Archaeological Resources Protection Act of 1979*, are discovered during construction, activities shall immediately cease and the responsible AO would be notified.

2.2.2.9.2 Paleontological Resources

Literature and records review and field check did not lead to the identification of scientifically significant fossil resources within the project area. The Green River Formation (Laney Member), which underlies the project area in its entirety, is recognized by the BLM as a sensitive formation (Class 5 formation) known to contain scientifically significant fossil resources elsewhere in Wyoming, including not far from the project area boundaries. As a result of the

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apparent absence of significant fossil resources in the project area, monitoring of surface disturbance is not recommended, however provision for the accidental discovery of such resources is recommended. If paleontological resources are uncovered during construction activities, Burlington or their contractors would suspend all operations to prevent further disturbance of such materials and would immediately contact the BLM's AO, who would arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan. Mitigation of paleontological resources would occur on a case-by-case basis, and Burlington would be responsible for the associated costs.

Table 2-2. Little Monument Project Employment Estimates, Per Well.

Pre-Approval & Permitting	**Crew Size**	**Man-Days**
Company Personnel	1	1
Permitting Contractor	1	1
Surveyors	2	2
Archeologist	2	1
Access Road/Well Pad Construction		
Operator Crew	8	16
Gravel Truck	1	2
Drilling		
Rig Move	5	10
Rig Supervisor	1	13
Rig Crews	10	130
Mud Logging	1	5
Mud Engineer	1	2
Mud Truck	1	2
Open Hole Logger	4	4
Fuel Trucks	1	11
Rig Mechanics	1	3
Completion		
Pulling Unit	4	16
Flowback Specialist	4	12
Consultant	1	9
Wireline	2	2
Fracturing	20	20
Drilling/Completion Total	**71**	**262**
Gathering System/ Water Line/Power Line Construction	10	50
Total Drilling and Field Development	**81**	**312**
Daily Average		10
Peak Day		21

Table 2-3. Little Monument Project Trip Estimates, Per Well.

Pre-Approval & Permitting	**Total One-Way Trips**
Company Personnel	2
BLM Personnel	2
Permitting Contractor	2
Surveyors	2
Archeologist	2
Access Road/Well Pad Construction	
Dozer Haul Truck	4
Grader Haul Truck	4
Backhoe Haul Truck	4
Crew Truck	4
Gravel Trucks	4
Drilling	
Rig Move	30
Rig Supervisor	26
Rig Crews	52
Open Hole Logger	2
Mud Engineer	4
Mud Trucks	4
Wire Line	6
Fuel Trucks	20
Rig Mechanics	6
Completion	
Pulling Unit	12
Flowback Specialist	16
Wireline	2
Consultant	18
Fracturing	20
Total Drilling	**248**
Gathering System/ Water Line Construction	42
Total Drilling and Field Development	**290**
Average Daily	10
Peak Daily	25

2.2.2.9.3 Air Quality/Noise

Burlington would not burn garbage or refuse at the drill sites or other facilities. All vehicles and construction equipment would be maintained to minimize exhaust emissions and would be properly muffled to minimize noise. Disturbed areas would be watered as necessary to suppress dust. Burlington employees and contractors would observe speed limits.

In any area of operations (drill site, construction areas, etc.) where noise levels may exceed federal OSHA safe limits, Burlington Resources and its contractors would provide and require the use of proper personnel protective equipment by employees.

2.2.2.9.4 Vegetation and Wetlands

Vegetation

- Removal and disturbance of vegetation would be kept at a minimum through construction site management (e.g., using previously disturbed areas and existing easements, limiting equipment/material, storage yard and staging area size, etc.).
- Well locations and associated roads and pipelines would be located to avoid or minimize impacts in areas of high value (e.g., sensitive species' habitats, wetland/riparian areas).
- Proper erosion and sediment control structures and techniques would be incorporated by Burlington into the design of well pads, roads, pipelines, and other facilities. Revegetation using a BLM-approved, locally adapted seed mixture containing native grasses, forbs, and shrubs would begin in the first appropriate season following disturbance.

Watershed and Water Resources

- Crossing of ephemeral, intermittent, and perennial streams associated with road and utility line construction would generally be restricted until after spring runoff and normal flows are established.
- Channel crossings by pipelines would be constructed so that the pipe is buried at least 4 feet below the channel bottom.
- Channel crossings by roads and pipelines would be constructed perpendicular to flow. Streams would be crossed perpendicular to flow, where possible, and all stream crossing structures would be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
- Disturbed channel beds would be shaped to their approximate original configuration.
- Operators would avoid disturbance within 500 feet of wetland/riparian areas and open water area and within 100 feet of ephemeral/intermittent drainages, where possible. This includes fueling, servicing, and staging of vehicles.
- Any disturbances to wetlands and/or waters of the U.S. would be coordinated with the U.S. Army Corps of Engineers (COE), and 404 permits would be secured as necessary prior to disturbance.
- Burlington would evaluate all project facility sites for occurrence of waters of the U.S., special aquatic sites, and wetlands, per COE requirements. All project activities would be located outside of these sensitive areas, where practical.

- Where disturbance of wetlands, riparian areas, streams, and ephemeral/intermittent stream channels cannot be avoided, COE Section 404 permits would be obtained by Burlington as necessary.

2.2.2.9.5 Wildlife

Burlington would comply with the following guidelines concerning avoidance of raptor nests and greater sage-grouse leks and nesting areas.

Raptors

Where feasible, pipeline ROW's would be selected and designed to avoid disturbance to raptor nests. If construction activities are to occur between February 1 and July 31, surveys for raptor nests within 0.5 to 1.0 mile of the proposed surface disturbances would be conducted to determine nest occupancy. All construction activities would be restricted between February 1 and July 31 within a 0.5-mile radius of all occupied raptor nests except ferruginous hawk and bald eagle nests, for which the seasonal buffer would be 1.0 mile. Surface structures requiring repeated human presence would not be constructed within 825 feet (1,970 feet for eagles) of active raptor nests, where practical. An active raptor nest is defined as a nest that has been occupied within the past three years.

Greater Sage-grouse

Surface disturbance within 0.25 mile of any sage-grouse lek would be avoided. If construction activities are planned in potential sage-grouse nesting habitat (i.e., areas within 2.0 miles of an active lek) between February 1 and July 31, BLM wildlife biologists would conduct field evaluations to identify active nests. If an active sage-grouse nest is identified in an area proposed for disturbance, construction activities would be delayed until nesting is completed and the young are fledged.

Sensitive Animals and Plants

The BLM would conduct FWS consultation and coordination as necessary for all mitigation activities relating to listed, or proposed for listing, threatened and endangered species and their habitats. In areas that have not been previously surveyed or cleared for these species, a qualified biologist/botanist would conduct surveys for these species in areas of potential habitat prior to disturbance, and if found, consultation with the FWS would be initiated, as necessary, and construction activities would be curtailed until the BLM, FWS, and Burlington concur on which activities can be authorized.

2.2.2.9.6 Health and Safety

Construction sites would be maintained in a sanitary condition at all times. Waste materials (human waste, trash, garbage, refuse, etc.) would be disposed of promptly at an appropriate waste disposal site. A litter policing program, approved by the AO, would be implemented by Burlington to cover all roads and other sites associated with the LMPA.

During construction and upon commencement of production operations, Burlington would have a chemical or hazardous substance inventory for all such items that may be at the site. Burlington would institute a Hazard Communication Program for its employees and would

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require subcontractor programs in accordance with OSHA CFR 1910.1200. All employees would receive the proper training in storage, handling, and disposal of hazardous substances.

Spill Prevention Control and Countermeasure (SPCC) Plans would be written and implemented as necessary in accordance with 40 CFR Part 112 to prevent discharge into navigable waters of the United States.

2.2.2.9.7 Existing Utilities

Burlington would secure an ROW on public lands from the BLM prior to construction and would notify other authorized ROW users of any pipeline crossings or overlaps. Any associated building or zoning on river, creek, or utility crossing permits would be secured from the appropriate regulatory agency or private entity prior to construction.

2.2.2.9.8 Visual Resources

Burlington would restore the disturbed areas to as near its original contour as possible as soon as the work allows. The disturbed areas would be planted with the seed mixture(s) recommended by Burlington and approved by the BLM. All aboveground facilities would be painted with Carlsbad Canyon 2.5Y 6/2 or a similar color determined by the AO to blend with the surrounding landscape, except for structures that require safety coloration in accordance with OSHA requirements.

2.2.2.9.9 Recreation

Burlington would minimize conflicts between project vehicles and equipment and recreation traffic by posting appropriate warning signs, implementing operator safety training, and requiring project vehicles to adhere to low speed limits.

2.2.2.9.10 Water Resources

Burlington would minimize impacts to surface waters by design and construction of interception ditches, sediment traps, silt fences, water bars and revegetation, and soil stabilization measures as needed.

Burlington would case wells during drilling, and case and cement all wells in accordance with Onshore Order No. 2 to protect accessible high quality water aquifers. Well casing and weldments would be of sufficient integrity to contain all fluids under high pressure during drilling and completion. Further, wells would adhere to the appropriate BLM cementing policy.

Reserve pits would be constructed to prevent seepage of fluids, utilizing drilling mud gel or poly liners. The liner would be impermeable and chemically compatible with all substances which may be put in the pit. Burlington would maintain two feet of freeboard on the reserve pits at all times to avoid the overflow danger.

Burlington would implement a pollution prevention plan (PPP) for storm water runoff at drill sites as required by the Wyoming Department of Environmental Quality (WDEQ) storm water NPDES permit requirements. The WDEQ requires operators to obtain a field permit for fields of 20 wells or more.

Burlington would coordinate all crossings or encroachments of waters of the U.S. with the COE.

2.2.2.9.11 Soils

Burlington would minimize areas of disturbance to the minimum required for safely accomplishing their objectives. Where feasible, pipelines would be located adjacent to roads to minimize disturbance. Burlington would install runoff and erosion control measures such as water bars, berms, and interceptor ditches as needed. Culverts for ephemeral and intermittent drainage crossings would be installed.

Burlington would include adequate drainage control devices and measures in road design (e.g., road berms and drainage ditches, diversion ditches, cross drains, culverts, out-sloping, and energy dissipators) at sufficient intervals and intensities to adequately control and direct surface runoff above, below, and within the road environment to avoid erosive, concentrated flows. In conjunction with surface runoff or drainage control measures, Burlington would use erosion control devices and measures such as temporary barriers, ditch blocks, erosion stops, mattes, mulches, and vegetative covers.

Upon completion of construction activities, Burlington would restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites. Re-seeding would be performed pursuant to APD/ROW stipulations. The following procedures are recommended to assure that all disturbed areas are stabilized and that revegetation efforts are enhanced so that adverse impacts do not occur (USDI-BLM 1997, USDI-BLM 1999b).

Scarification. Prior to revegetation, all compacted areas will be scarified by ripping or chiseling to loosen compacted soils. Scarification promotes water infiltration, better soil aeration and root penetration. Scarification will be done when soils are dry to promote shattering of compacted soil layers.

Seedbed Preparation. Proper seedbed preparation is critical for seed establishment. Seedbed preparation will be conducted immediately prior to seeding to prepare a firm seedbed conducive to proper seed placement and moisture retention. Seedbed preparation will also be performed to break up surface crusts and to eliminate weeds, which may have developed between final grading and seeding. In most cases, chiseling is sufficient because it leaves a surface smooth enough to accommodate a tractor-drawn drill seeder and rough enough to catch broadcast seed and trap moisture and runoff. In low to moderate saline soils, a firm, weed-free seedbed is recommended. With high salinity levels, particularly when a high water table is involved, a fallow condition may not provide the best seedbed. If existing vegetation and weeds are chemically eradicated, the remaining dessicated roots and stems improve moisture infiltration and percolation, reduces evaporation from the soil surface, and protects emerging seedlings (Majerus 1996).

Seed Mixtures. Seed mixtures will be specified on a site-specific basis and their selection will be justified in terms of local vegetation and soil conditions. Livestock palatability and wildlife habitat needs would be given consideration in seed mix formulation. The recommended general seed mixtures shown in Table 2-4 were developed from observation of successful revegetation in the Green River Basin region and observation of dominant species in the project area. These mixtures comply with Executive Order 13112 (Invasive Species). EO 13112 also specifies that use of any introduced plant species must have prior BLM approval for federal lands.

BLM guidance for native seed use is BLM Manual 1745 (Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants). The WGFD recommends that BLM consider shrub species in seed mixtures. BLM will coordinate with WGFD to insure that the correct shrub species are incorporated into seed mixtures on federal lands. Native species that will be considered include bluebunch wheatgrass, streambank wheatgrass, needle-and-thread grass and Wyoming big sagebrush. Fall seeding will occur from about September 15 until ground freeze or snow pack prevents critical seed soil coverage. The optimum time to seed a forage or cover crop in saline-alkaline soils is late fall (mid-October to December) or during a snow-free period during the winter (Majerus 1996). Ideally, in saline-alkaline soils, the seed should be in the ground before the spring season so that it can take advantage of the diluting effects of early spring moisture. Spring seeding will be completed by May 30 or as directed by the BLM. Seed will be used within 12 months of testing.

Table 2-4. BLM-Recommended Seed Mixes for Disturbed Surface Land Areas in the RSFO Management Area (USDI-BLM 1999 and Glennon 2003).

Plant Species	**Variety (if applicable)**	[illegible]
SALINE/SODIC SOILS		
Western wheatgrass	'Rosanna'	4.0
Sandberg bluegrass		2.0
Indian ricegrass		3.0
Bottlebrush squirreltail		1.0
Scarlet globemallow		1.0
Gardner saltbush		2.0
Shadscale		2.0
TOTAL		**15.0**
WETLAND/HIGH WATER SOILS		
Tufted hairgrass		2.0
Basin wildrye		5.0
Slough grass		6.0
Bluejoint reedgrass		3.0
TOTAL		**16.0**
UPLAND SOILS		
Thickspike wheatgrass	'Critana'	4.0
Western wheatgrass	'Rosanna'	4.0
Indian ricegrass		4.0
Scarlet globemallow		1.0
Winterfat		2.0
Fourwing saltbush or shadscale		1.0
TOTAL		**16.0**

* Pounds/acre Pure Live Seed.

Seeding Method. Drill seeding will be used where the terrain is accessible by equipment. The planting depth for most forage species is 1/4 to 1/2 inch (5-10 mm). A double disk drill equipped with depth bands will ensure optimum seed placement. The seed will be separated by boxes to prevent seed from separating due to size and weight. Rice hulls or other appropriate material will be added to the seed as necessary to prevent separation. The drill will be properly calibrated so that seed is distributed according to the rates specified for each seed mix.

Although not anticipated to be common in the project area, areas too steep for drill seeding or where approved by the BLM, broadcast seeding may also be used. Broadcasted seed should occur onto a rough seedbed and then should be lightly harrowed, chained or raked to cover the seed. The seeding rate should be doubled for the recommended mixtures because the mixtures were developed for drill seeding. The method used to cover the seed should be selected so that the seed is lightly covered but maintains the surface in rough condition. The broadcast seeder should be properly calibrated or the seeding should occur over a calculated known area so that the proper seeding rate is applied.

Mulching. Where mulching is deemed necessary, a certified weed-free straw or hay mulch will be crimped into the soil at an application rate of two to four tons per acre. Mulches will be applied by blowers, spreaders or by hand. The mulch will not be finely shredded during application and mulch strand lengths will be long enough to be anchored by crimping. The mulch will be spread uniformly over the area so that 75 percent or more of the ground surface is covered. Mulch will be crimped to a depth of two to three inches.

In addition, Burlington would reclaim illegal access roads and other disturbances in the LMPA which are not being utilized by current Burlington operations.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

2.3.1 Fewer Well Sites

Burlington briefly examined developing fewer wells, but concluded that the number of wells in the Proposed Action was the fewest justifiable to rigorously define the gas resource in the LMPA.

2.3.2 Directional Drilling from Fewer Well Sites

Burlington examined utilization of horizontal or directional drilling to minimize surface disturbance. This alternative is not evaluated further for the following reasons:

- Economics – horizontally drilled wells are estimated to cost up to 300% as much as similar vertically drilled wells with no commensurate increase in production. (EIA 1993) The Vermillion Basin EA DR/FONSI, Appendix D (USDI, 2002) estimates directional drilling costs at 140% of vertically drilled wells. This resource extraction method is a process driven by subsurface geologic criteria.
- Reservoir issues – The Frontier Formation (the target pay zone for the LMPA) is fairly deep (greater than 9,000 feet below the surface) and of limited porosity. Fracture stimulation is key to the development of an economic gas well in this type of formation. Horizontal or directional drilled wells can exhibit more severe problems than vertical

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wells due to collapse of the formation into the wellbore during fracture stimulation. In addition, horizontal drilling technology requires precise control of target locations in three dimensions. Even the thickest gas producing zones in the project area are below the vertical resolution of current seismic technology and yield no target control for lateral drilling. Thus, without the knowledge of gas seam locations, directional drilling would not produce the desired results.

- Surface disturbance – the LMPA is a mature gas producing area with 31 existing gas wells in the LMPA since 1978. The townships overlapping the Lincoln Road Project area, which includes the LMPA, contain 418 producing wells. Burlington is proposing to drill another 31 wells which would disturb approximately 94 acres. Utilizing horizontal or directional drills could decrease this disturbance, but not significantly.

CHAPTER 3

AFFECTED ENVIRONMENT

CHAPTER 3

AFFECTED ENVIRONMENT

3.0 INTRODUCTION

The Affected Environment chapter of this environmental assessment (EA) for the proposed Little Monument Natural Gas project discusses environmental, social, and economic factors as they currently exist within the project area. The material presented here has been guided by management issues identified by the Bureau of Land Management (BLM), Rock Springs Field Office and public scoping.

This proposal could potentially affect critical elements of the human environment as listed in BLM's National Environmental Policy Act (NEPA) Handbook H-1790-1 (USDI-BLM 1988) and more recent Executive Orders. The critical elements of the human environment, their status in the LMPA and their potential to be affected by the proposed project are listed in Table 3-1. In addition to the critical elements, potential effects of the proposed project to other elements considered in this EA, are listed in Table 3-2.

Table 3-1. Critical Elements of the Human Environment[1], Little Monument Natural Gas Project Sweetwater County, Wyoming.

Element	Status on the Project Area	Addressed in text of EA
Air quality issues	Potentially affected	Yes
Areas of critical environmental concern	None present	No
Cultural resources	Potentially affected	Yes
Environmental justice	Not affected	No
Prime or unique farmlands	None present	No
Floodplains	None present	No
Native American religious concerns	Potentially affected	Yes
Invasive plants	Potentially affected	Yes
Threatened and endangered species	Potentially affected	Yes
Hazardous or solid wastes	Potentially affected	Yes
Water quality (surface and ground water)	Potentially affected	Yes
Wetlands/riparian zones	Potentially affected	Yes
Wild and scenic rivers	None present	No
Wilderness	None present	No

[1] As listed in BLM *National Environmental Policy Act Handbook H-1790-1* (USDI-BLM 1988) and subsequent Executive Orders

Table 3-2. Other Elements for Analysis, Little Monument Project Area

Element	Status on the Project Area	Addressed in text of EA
Geology/Minerals/Paleontology/Hazards	Potentially affected	Yes
Soils	Potentially affected	Yes
Vegetation	Potentially affected	Yes
Wildlife	Potentially affected	Yes
Special Status Species	Potentially affected	Yes
Noise	Potentially affected	Yes
Visual Resources/Recreation	Potentially affected	Yes
Socioeconomic Issues	Potentially affected	Yes
Range/Other Land Uses	Potentially affected	Yes

3.1 GEOLOGY/MINERALS/PALEONTOLOGY

3.1.1 Geology

3.1.1.1 Regional Geologic Overview

The LMPA lies in the west-central part of the Bridger Basin, the western topographic and structural extension of the greater Green River Basin. The greater Green River Basin is a large structural and topographic basin that occupies most of southwestern Wyoming. Both the Bridger and Green River basins are part of the Wyoming Basin Physiographic Province, which is characterized by large intermontane structural basins bounded by mountain uplifts that have Precambrian granitic rocks at their cores. The basins are filled by deposits of latest Cretaceous and Tertiary age sediments that exceed thousands of feet in thickness in the subsurface.

General structural elements that border the Bridger Basin include the Rock Springs Uplift to the east, the Wind River Range to the north, the Uinta Range to the south, and the Wyoming Thrust Belt to the west. A buried structural arch, the Moxa Arch, occurs at depth west of the area. The arch has a north-trending axis that is situated along the western side of the basin, immediately east of the leading edge of the Thrust Belt. Cretaceous formations produce oil and natural gas at depths ranging from 9,000 to 11,000 feet below grade along the arch.

The precursor to the modern greater Green River Basin developed during the late Cretaceous Period (about 75 million years ago) and began filling with sediments eroded from surrounding uplifts to the north, east and south. The Utah-Wyoming Thrust Belt began forming west of the area in early Cretaceous time with the development of large scale eastward movement of thick piles of sedimentary rocks along relatively low angle thrust faults in western Utah. Uplift and thrusting progressed eastward throughout the Cretaceous so that by the end of that period and during the succeeding early Paleocene, thrusting and associated uplift had progressed into southwestern Wyoming.

Sediment accumulated in the Bridger (and Green River Basin) in a variety of environments related to their distance from the bordering mountain fronts. Near the mountains, landslides, mudslides, and alluvial fans accumulated coarse-grained sediments. Progressively basinward from the mountains, streams, rivers, and ponds or lakes accumulated fine-grained sediments in a broad ancient flood plain and lake basin. During times when sediment supply was high, deposits of rivers and associated ponds accumulated in a broad flood basin that occupied most of the ancient basin. When uplift, erosion, and sediment supply diminished, but the basin floor continued to sink, a large lake system developed in the ancient basin center. This ancient lake system, the Green River Lakes, fluctuated dramatically in size, throughout its existence. When lake stands were high, lake deposits expanded to cover most of the basin and river deposits were restricted to the basin edges. When lake stands were low, river deposits expanded to cover most of the basin and lake deposits were restricted to the basin center. Thick, chemically precipitated deposits formed in and around the lake at times of lake restriction.

Periodic oscillation of the level of the ancient lakes resulted in a complex interfingering relationship between lake sediments and their laterally equivalent riverine sediments seen in the rock record. During the late middle Eocene, the last Green River Lake filled with chemically precipitated rocks and sediment and riverine deposits of a broad ancient flood basin once again spread across the basin. Large volumes of ash derived from the Absaroka area of northwestern Wyoming periodically blanketed the area and helped fill the lake basin with sediment.

Geologic mapping by the USGS and Wyoming Geological Survey document that sedimentary deposits of the Laney Member of the Green River Formation of early Tertiary age crop out in the LMPA (Love and Christiansen 1985, Brady 1985). A thin veneer of Quaternary soil, alluvium, colluvium, and aeolian (wind blown) material occurs above rocks of the Laney Member, but these deposits are too thin to be mapped.

Laney Member-Green River Formation

The Laney Member that underlies the LMPA at the surface forms the top of the Green River Formation and records in its sediments the greatest expansion of the ancient lake system (Lake Gosiute) followed by its final restriction and desiccation. At its peak the lake in which the Laney accumulated occupied more than 75% of the greater Green River Basin, or an area of about 15,000 square miles.

Of the three rocks units (LaClede Bed, Sand Butte Bed, and Hart Cabin Bed) comprising the Laney Member distinguished by Roehler (1993), only the LaClede Bed crops out in the LMPA. The LaClede Bed regionally consists chiefly of oil shale with lesser amount of limestone, sandstone, claystone and tuff. Thick deposits of oil shales characteristic of the LaClede Bed that occur in the more central areas of the greater Green River Basin accumulated in the deeper parts of the Lake Gosiute, during the longest high stand of the lake, which may have lasted as long as 2.5 million years. The LMPA would have occupied an area nearer the lake edge and was a site dominated by sandstone, shale, and marlstone.

Older-Underlying Sedimentary Rock Units

Underlying the Green River Formation in the LMPA are Phanerozoic sedimentary rocks, which range from Cretaceous to Cambrian in age. Some of these rocks produce oil and gas. The Phanerozoic sediments are underlain by Precambrian metamorphic bedrock that comprises part of the ancient North American cratonic shield.

Geological Hazards

Naturally occurring geologic hazards include fault generated earthquakes, floods, landslides or other mass movements. There are no known faults with surface expression or earthquake epicenters mapped within the LMPA (NEIC 2003, WGS 2003). The nearest mapped earthquake epicenter occurs in the northeastern part of the LaBarge Oil and Gas Field, approximately 15 miles to the northwest, where a quake of 2.9 on the Richter scale occurred at a depth of 5 km in 1993.

There are no landslide deposits mapped in the area and no major areas of surface mass movement were observed during a field survey. Topographic relief is approximately 355 feet (6,775 ft to 7,130 ft) and slope over most of the area is gentle. Slopes are steepest eastward into an unnamed tributary of Fourmile Gulch (Sec. 26, T25N, R111W), where over a lateral distance of about 2,000 ft elevation rises about 170 ft yielding a grade of about 8.5%. Geologic dip on the Laney Member of the Green River Formation exposed at the surface is nearly horizontal and overlying soils are well drained, thus lessening the chance for naturally occurring mass movements.

3.1.2 Mineral Resources

Major mineral resources within the LMPA are oil and gas. Trona and oil shale deposits that characterize parts of the Green River Formation occur to the south and east of the LMPA in areas that were in the most central parts of ancient Green River Lakes System.

Oil and gas production was first discovered in the LMPA in 1979 in Burlington Resources' Little Monument Unit 23-14, drilled in Section 14, T25N, R111W. Production is from the first and second benches of the Cretaceous age Frontier Formation at depths of about 9,250 ft and 9,350 ft respectively. To date, the LMPA has produced approximately 26,709 Bbls oil and 21,332,152 Mcf gas. The unit currently contains 31 producing natural gas wells, 2 plugged and abandoned wellbores, and 1 temporarily abandoned wellbore.

3.1.3 Paleontology

Paleontologic resources within sedimentary deposits of the Laney Member of the Green River Formation (including the LaClede Bed), in Wyoming record the history of animal and plant life in Wyoming during the early part of the Cenozoic Era (middle Eocene Epochs). Fossils of gastropods, bivalves, and fish are common in the shales and some limestones of the LaClede Bed. Impressions of plants and insects have also been reported from shales. A single fossil mammal has been recovered from a black, fossil gastropod-bearing chert in the Washakie Basin (Roehler 1992). Locality searches of the University of Wyoming (Laramie), University of Colorado (Boulder), and University of California (Berkeley) museum fossil collections did not reveal any existing localities within the area and the only fossils observed during spot field survey of the LMPA were sparse fossil wood.

Paleontology Ranking

The BLM considers the Green River Formation to be a Class 5 paleo formation meaning they are highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils and/or scientifically significant nonvertebrate fossils, and that are at risk of natural degradation and/or human-caused adverse impacts. However, not all areas of Class 5 paleo formations are highly fossiliferous.

3.2 CLIMATE AND AIR QUALITY

3.2.1 Climate

The project area is located in a continental dry, cold-temperate-boreal climate (Trewartha 1968), which has limited rainfall and long, cold winters. Meteorological measurements collected at La Barge, Wyoming (1958-2001), approximately 13 miles northwest of the project area, indicate that the annual average total precipitation for the area is 8.3 inches, ranging from 3.4 inches (1975) to 17.8 inches (1995). Precipitation is greatest from late spring to early fall, with the peak monthly average of 1.35 inches occurring in May. An average of 30.9 inches of snow falls during the year (an annual high 43.6 inches in 1987), with heaviest monthly snowfalls occurring in December and January. Table 3-3 shows the mean monthly temperature ranges and average precipitation amounts.

Temperatures are generally cooler, frost-free periods shorter, and both precipitation and snowfall greater at higher elevations. The region is typically cool, with average daily temperatures (in degrees Fahrenheit; °F) ranging between –1 °F (low) and 32 °F (high) in mid winter and between 42 °F (low) and 79 °F (high) in mid summer. Extreme temperatures have ranged from –52 °F (occurring in 1990) to 95 °F (occurring in 1973). The frost-free period (above 32 °F) generally occurs from early June to mid-September.

The project area is subject to strong and gusty winds, reflecting channeling and mountain valley flows due to complex terrain. During the winter months, strong winds are often accompanied by snow, producing blizzard conditions and drifting snow. The closest comprehensive wind measurements are collected by Amoco Corporation in the Jonah Field, approximately 27 miles north and east of LMPA. Figure 3-1 shows the relative frequency of winds, with radial distributions by speed class, indicating the direction of the wind source. From this information, it is evident that the winds originate from the northwest nearly 40 percent of the time. The annual mean wind speed is nearly 12 mph.

The frequency and strength of the winds greatly affects the dispersion and transport of air pollutants. Because of the strong winds in the project area, the potential for atmospheric dispersion is relatively high (although nighttime cooling will enhance stable air, inhibiting air pollutant mixing and transport).

Tables 3-4 and 3-5 show the frequency distribution of wind speed and atmospheric stability class in the Jonah Field. The atmospheric stability class is the measure of atmospheric turbulence, which directly affects pollutant dispersion. The stability classes are divided into six categories designated "A" (unstable) through "F" (stable). The "D" (neutral) stability class occurs more than half of the time. Stability classes A through C are generally associated with good dispersion, stability class D with fair dispersion, and stability classes E and F with poor dispersion.

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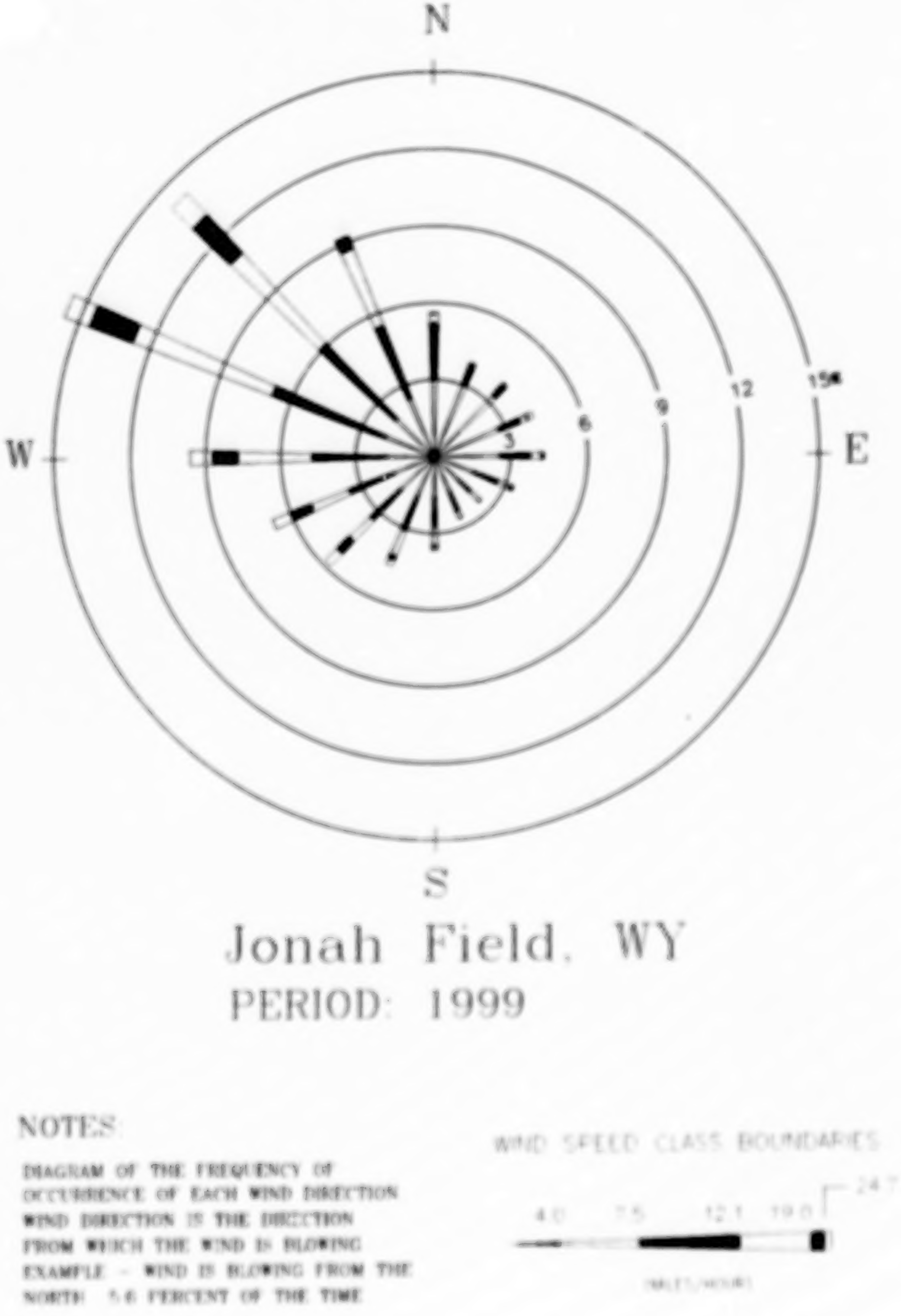
Table 3-3. La Barge, Wyoming, 1958-Present Mean Monthly Temperature Ranges and Average Precipitation Amounts

Month	Average Temperature Range (°F)	Average Precipitation (inches)	Average Snowfall (inches)
January	-2 - 31	0.3	6.2
February	1 - 35	0.4	4.4
March	14 - 43	0.4	4.0
April	23 - 54	0.8	2.8
May	32 - 65	1.4	1.3
June	39 - 73	1.1	0.0
July	44 - 83	0.7	0.0
August	42 - 82	0.9	0.0
September	33 - 71	0.8	0.1
October	22 - 59	0.6	1.7
November	11 - 42	0.5	4.3
December	-1 - 31	0.5	6.0
ANNUAL	38.6 (mean)	8.3 (mean)	30.9 (mean)

Source: (WRCC 2001)

Table 3-4. Wind Speed Distribution.

Wind Speed (miles/hour)	Percent of Occurrence
0-4.0	7.4
4.0-7.5	26.3
7.5–12.1	29.3
12.1-19.0	23.9
19.0-24.7	7.5
Greater than 24.7	5.5



Jonah Field, WY
PERIOD: 1999

NOTES:

DIAGRAM OF THE FREQUENCY OF OCCURRENCE OF EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 5.6 PERCENT OF THE TIME.

Figure 3-1. Wind Rose for the Little Monument Project Area.

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Table 3-5. Stability Class Distribution.

Stability Class	Percent of Occurrence
A	2.6
B	6.4
C	11.2
D	59.0
E	17.4
F	3.3

3.2.2 Air Quality

The Wyoming and National Ambient Air Quality Standards set absolute upper limits for specific air pollutant concentrations at all locations where the public has access. Also, the Prevention of Significant Deterioration (PSD) Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict. The project area and surrounding areas are classified as PSD Class II. The two closest PSD Class I areas, the Bridger and Fitzpatrick Wilderness Areas, lie over 45 miles to the northeast of the project area and could be impacted by cumulative project source emissions.

All NEPA analysis comparisons to PSD Class I and II increments are intended to evaluate a threshold of concern, and do not represent a regulatory PSD Increment consumption analysis. The determination of PSD increment consumption is an air quality regulatory agency responsibility. Such an analysis would be conducted as part of the New Source Review process for a major source, as would an evaluation of potential impacts to Air Quality Related Values (AQRV) such as visibility, aquatic ecosystems, flora, fauna, etc performed under the direction of Federal Land Managers, or would be conducted to determine minor source increment consumption.

Although specific air quality monitoring has not been conducted within the project area, air quality conditions are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions. These factors contribute to relatively low ambient air pollutant concentrations, supported by the finding that background values measured in the region are well below established standards. Measured air pollutants include: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone, particulate matter less than 10 microns in effective diameter (PM-10), and sulfur dioxide (SO_2). Measured regional background air pollutant concentrations, applicable Wyoming and National Ambient Air Quality Standards, and PSD Class I and II increments (measured in micrograms per cubic meter, or $\mu g/m^3$) are provided in Table 3-6.

All background concentration data have been identified by WDEQ-AQD as the most representative air quality monitoring data available for the region. An estimate of background air quality concentrations is needed not only to determine existing air quality conditions but to combine with modeled project-related air quality impacts for comparison to applicable air quality standards. It is important that each pollutant's background concentration, model predictions, and air quality standards are based on the same averaging times.

Continuous visibility-related optical background data have been collected at the PSD Class I Bridger Wilderness Area in Wyoming, as part of the Interagency Monitoring of PROtected Visual Environments (IMPROVE) program. Visibility in the Central Rocky Mountains is very good (averaging over 70 miles Standard Visual Range), with fine particle impacts accounting for nearly half of the average degradation (Sisler 1996). In addition, a background atmospheric deposition (acid rain) monitoring system is in place at the National Acid Deposition Program/National Trends Network sampling station near Pinedale, Wyoming, and site-specific lake chemistry (pH, acid neutralizing capacity, elemental concentrations, etc.) monitoring is conducted by the U.S. Geological Survey Water Quality Division in several high mountain lakes in regional wilderness areas. Total nitrogen and sulfur deposition near Pinedale has been below Forest Service guidelines since 1990 (see Figures 3-2 and 3-3).

The WDEQ-AQD, under their EPA approved State Implementation Plan, is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made, and those development plans are subject to applicable air quality laws, regulations, standards, control measures, and management practices. Therefore, WDEQ-AQD has the ultimate responsibility for reviewing and permitting the project prior to its operation. Unlike the conceptual "reasonable, but conservative" engineering designs used in NEPA analyses, any WDEQ-AQD air quality preconstruction permitting demonstrations required would be based on very site-specific, detailed engineering values, which would be assessed in the permit application review.

3.3 SOILS

The topography of the Little Monument project area consists of bedrock knobs, rolling uplands underlain by shales, sandy shales, and sandstones of the middle Eocene Green River Formation (LaClede Bed). No major drainages head in the project area and as a result these rocks are relatively uneroded. Shales underlying the surface are deeply weathered and, together with a significant amount of aeolian (wind-blown) sand, the weathered rock detritus serves as the parent material for the development of an Upland Slope Soil that is distributed throughout the LMPA. This soil is shallow (less than 60 cm total thickness), occurs on slopes of 0-10%, and consists of loamy sand and sandy clay loam. The following site specific soil description is characteristic of the Upland Slope Soils in the area:

Site LMSO1

UTM 12: 579607E, 4664818N. Surface of soil littered with weathered 5-20 mm chips of weathered shale and sandstone.

A = Non-calcareous loamy sand; 2 cm.

Bt = Weakly calcareous sandy clay loam; unconsolidated; pH = 7.1; 10YR4/4 (dark yellowish-brown); 23 cm.

Table 3-6. Air Pollutant Background Concentrations, State and Federal Ambient Air Quality Standards, and PSD Increments (µg/m³).

Pollutant/Averaging Time	[illegible] Concentration	[illegible]	[illegible]	[illegible]
Carbon Monoxide (CO)				
1-hour	3,336 [a]	40,000	n/a	n/a
8-hour	1,381 [a]	10,000	n/a	n/a
Nitrogen Dioxide (NO_2)				
Annual	3.4 [b]	100	2.5	25
Ozone				
1-hour	169 [c]	235	n/a	n/a
8-hour	147 [c]	157		
Particulate Matter (PM_{10})				
24-hour	47 [d]	150	8	30
Annual	16 [d]	50	4	17
Sulfur Dioxide (SO_2)				
3-hour (National)	132 [e]	1,300	25	512
24-hour (National)	43 [e]	365	5	91
24-hour (Wyoming)	43 [e]	260	n/a	n/a
Annual (National)	9 [e]	80	2	20
Annual (Wyoming)	9 [e]	60	n/a	n/a

Notes: n/a - not applicable
Wyoming Ambient Standards from: Wyoming Air Quality Standards and Regulations, Chapter 2– Ambient Standards
National Ambient Standards from: 40 CFR Part 50
PSD Increments from: 40 CFR Part 52 Subpart A 52.21 Prevention of Significant Deterioration of Air Quality.

Background Air Quality Data Sources:

[a] Data collected by Amoco at Ryckman Creek for an 8-month period during 1978-1979, summarized in the Riley Ridge EIS (BLM, 1983).

[b] Data collected at Green River Basin Visibility Study site, Green River, Wyoming during period January-December, 2001 (ARS, 2002).

[c] Data collected at Green River Basin Visibility Study site, Green River, Wyoming during period June 10, 1998 through December 31, 2001 (ARS, 2002).

[d] Data collected by WDEQ at Emerson Building, Cheyenne, Wyoming, 2002.

[e] Data collected at LaBarge Study Area at the Northwest Pipeline Craven Creek site (1982-1983).

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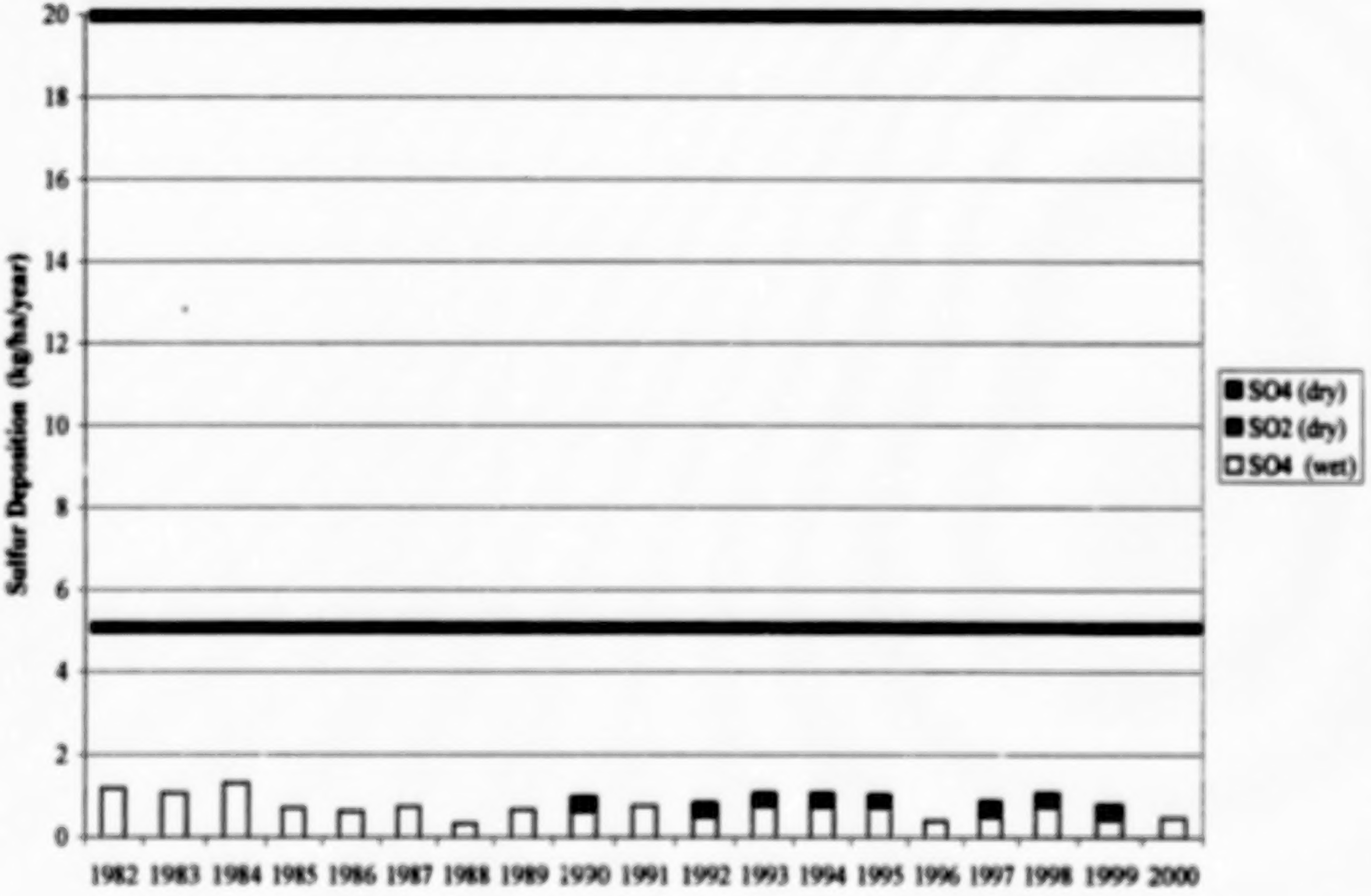

Source: NADP Pinedale (wet deposition), CASTNet Pinedale (dry deposition)

Figure 3-2. Total Sulfur Deposition near Pinedale, Wyoming.

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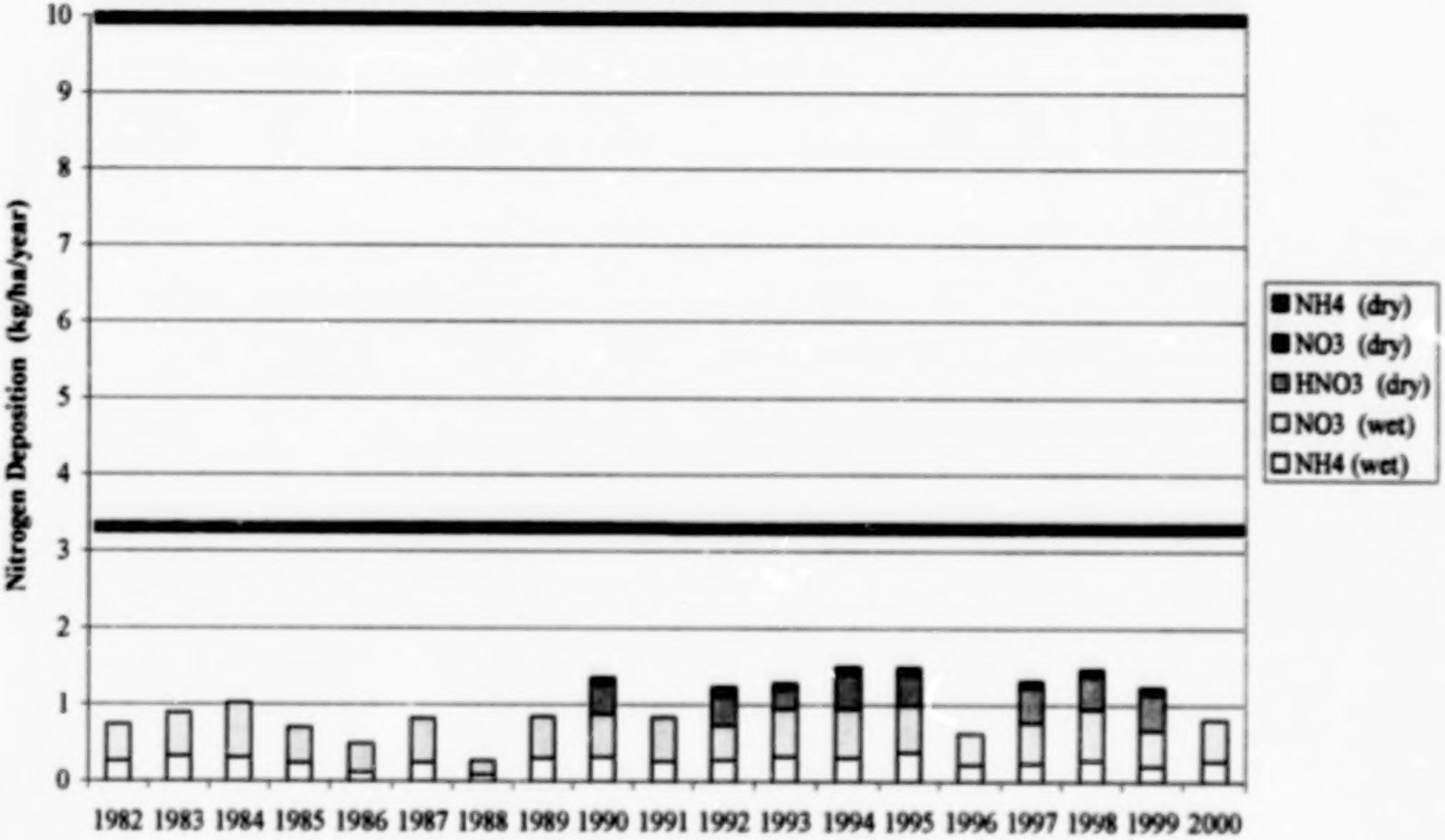

Source: NADP Pinedale (wet deposition), CASTNet Pinedale (dry deposition)

Figure 3-3. Total Nitrogen Deposition near Pinedale, Wyoming.

Btk = Highly calcareous sandy clay loam with 2-5 mm CaCO3 pisoliths (stage 1 calcrete); 10YR6/3 (pale brown); 27 cm.

Ck = Weathered shale of Green River Formation.

Due to its high sand content in the Upland Slope Soil, the area is well-drained, very permeable, and exhibits little evidence of surface runoff. Erosion potential is thereby low, but would be increased by blading on slopes or removal of plant cover.

3.4 WATER RESOURCES

Water resources in the project area include both streamflow and groundwater. Surface water resources include several ephemeral (flow only in response to rainfall or snowmelt) streams within the Green River drainage basin. The headwaters of tributaries to the Green River that originate within the project area include Fourmile Gulch, an unnamed tributary of Fourmile Gulch, and the West Fork of Buckhorn Canyon. Fourmile Gulch and its tributaries drain the majority of the project area. West Fork drains the extreme northeastern corner of the project area and flows into Buckhorn Canyon. Both Buckhorn Canyon and Fourmile Gulch are major tributaries of Eighteenmile Canyon. The ephemeral Eighteenmile Canyon is an important surface water resource in the general vicinity, but is more than 10 miles to the east and south of the project area. Eighteenmile Canyon discharges into the Green River approximately 25 miles downstream of the Fontenelle Reservoir. No surface runoff from the project area drains directly into the Green River. The Green River and Fontenelle Reservoir are important surface water resources in the general vicinity, but the project area is located approximately 3.5 miles north of the reservoir at its closest point. No springs are located within or near the project area. Groundwater resources include free water contained within relatively shallow aquifers that are or could be used for domestic, agricultural, and/or industrial purposes. The occurrence and distribution of water resources in the project area are dependent on climate, soils, and structural geology (Geology Section 3.1).

3.4.1 Precipitation

Climatic conditions are greatly affected by the large changes in altitude that occur within Sweetwater County. Precipitation ranges from roughly eight inches per year in the southeastern part of the county to an estimated 16 inches per year in the southern most part of the county. The annual precipitation recorded at different locations but of similar elevations within Sweetwater County is fairly consistent. Most of the county receives less than 10 inches of precipitation, and is classified as desert (Martner 1986).

The mean annual precipitation recorded at the Fontenelle Dam station for the period of record is 7.35 inches. Precipitation is somewhat evenly distributed throughout the year with a peak in May. The majority of precipitation falls as rain from frontal systems and thunderstorms. In regard to intensity of rainfall events, the 50-year, 24-hour precipitation rate is 2.0 inches (Miller et al. 1973). Average total snowfall depth for the year at Fontenelle Dam is approximately 23 inches, with the greatest snowfall occurring in December and February (WRCC 2003). Due to the effect of ablation and snow drifting, a discontinuous snow cover is usually present during the winter.

3.4.2 Surface Water

3.4.2.1 Surface Water Quantity

Surface water occurs relatively infrequently within the project area, which is situated at the headwaters of Fourmile Gulch, an unnamed tributary of Fourmile Gulch, and a very small portion of West Fork. Ground surface elevations range from over 7,200 feet to 6,900 feet above sea level. As shown on Figure 3-4, the project area is drained almost entirely by tributaries of Fourmile Gulch. West Fork, an ephemeral tributary of Buckhorn Canyon, drains the extreme northeastern corner of the project area. Fourmile Gulch and Buckhorn Canyon are both ephemeral tributaries of Eighteenmile Canyon Creek, itself an ephemeral stream. There are no naturally occurring lakes, ponds, or springs in the project area.

The project area falls entirely within the Green River drainage basin. Fourmile Gulch (a 76 square-mile watershed) flows generally southward to intersect Eighteenmile Canyon. West Fork (a 51 square-mile watershed) is a tributary of Buckhorn Canyon. Buckhorn Canyon (a 143 square-mile watershed) also flows generally southward into Eighteenmile Canyon (a 465 square-mile watershed), which is a tributary of the Green River. The Green River drains to the Colorado River, which ultimately drains into the Pacific Ocean. The Green River is the only perennial stream in the general vicinity of the project area. South of the project area the Green River exits Fontenelle Reservoir, the largest body of water in the general area with a design capacity of 34,000 acre-feet. The reservoir has domestic, industrial, recreation, hydroelectric, and irrigation uses. The Green River and its tributaries above Fontenelle Reservoir originate mostly in mountainous areas, where significant annual precipitation occurs and where geologic conditions induce groundwater discharge.

No streamflow-gaging or sampling stations have been established by the United States Geological Survey (USGS) within or near the project area. Therefore, no streamflow or surface water quality records currently exist to support a site-specific description of the surface water resources. USGS Station 0921120 (Green River Below Fontenelle Reservoir, Wyoming) is the closest continuous streamflow gaging site to the project area. This station measures streamflow from a 4,280 square-mile drainage area and has been operated continuously since 1964. The mean annual streamflow over the period of record at this station is 1,734 cubic feet per second (cfs). The highest mean annual flow occurred in 1986 when discharge reached 3,093 cfs. The lowest mean annual discharge from the reservoir was 582 cfs in 1977. The highest instantaneous peak flow from Fontenelle Reservoir was 14,100 cfs measured on July 3, 1982. The USGS maintained a crest-stage gage at Station 09211300, Fourmile Gulch Trib. Near Fontenelle, Wyoming, from 1979 through 1981. This site is located on the western unnamed tributary of Fourmile Gulch, and is located about 4.5 miles downstream of the project area. The drainage area above this site is 14.2 square miles. This unnamed tributary of Fourmile Gulch drains roughly two-thirds of the project area (Figure 3-3). Instantaneous peak discharges recorded at this site were 84.0 cfs in 1979, 6.0 cfs in 1980, and 3.0 cfs in 1981 (USGS 2003).

To estimate the streamflow characteristics of streams with no streamflow-gaging stations Lowham (1988) developed equations that relate features of a drainage basin to streamflow. Lowham identified three distinct hydrologic regions (Mountainous, High Desert, and Plains) within the State of Wyoming to estimate streamflow characteristics in each region. Most of the project area is within the High Desert Region and streams that drain desert areas in Wyoming are usually ephemeral or intermittent. Typically, under this flow regime, ephemeral streamflow will last for only a short period of time after a runoff-producing event, or intermittent streamflow is sustained for longer periods of time due to an association with groundwater (i.e., discharge from a spring).

Flow within the ephemeral stream channels correlates directly with precipitation; surface runoff occurs during spring and early summer as a result of snowmelt and rainfall (Lowham et al. 1985). Streams within the project area receive no support from groundwater discharge to sustain flow; consequently, there are extended periods of time when the drainages are dry. Active stream channels in the project area exhibit flow only during snowmelt and high-intensity, short-duration summer thunderstorms. Rainstorm runoff can cause large peak flows, although the duration of flow from rainfall is relatively short in comparison to snowmelt runoff. Because precipitation varies from year to year, runoff volumes vary as well.

The only surficial geologic unit within the project area is the Tertiary-age Laney Shale Member of the Green River Formation. The Laney Shale generally consists of an interbedded mixture of marlstones (calcareous clays), siltstones, mudstones, shales, and oil shale of lacustrine deposition (Welder and McGreevy 1966). The types of particles that comprise the sedimentary bedrock largely determine the texture of the residual soil that develops from that deposit. Therefore, most of the soils within the project area generally have a heavy clay texture with low infiltration and permeability rates. Soil and bedrock susceptibility to water erosion can be severe due to low permeability, and the area's sparse desert shrubland vegetative cover exposes more surface to raindrop impact erosion. As a result of the project area's slow infiltration rates and sparse vegetal cover, runoff potential is relatively high. The mean annual runoff from this high desert area is estimated to be between 0.5 and 2 inches, or between seven and 20 percent of the total annual precipitation (Wyoming Water Research Center 1990).

Based upon a recent (February 2003) review of the Wyoming State Engineer's Office (SEO) records, there are no active surface water rights within the project area. According to the SEO, temporary surface water rights in this area were issued in the late 1970's and early 1980's, but have since expired. These consisted of water haul truck operations from the Green River for immediate uses associated with oil and gas development (i.e., well drilling, road and facility construction).

3.4.2.2 Surface Water Quality

Surface water quality in semiarid regions is seasonal and dependent on the magnitude and frequency of discharge events, although the dissolved solids concentration typically increases in the downstream direction. During periods of little to no precipitation, evaporation and capillary action produce a salt residue on the surfaces of bedrock, soils, and channel deposits. Runoff from rainfall and snowmelt then periodically flushes the accumulated salts downstream. During high-intensity thunderstorm events, the dissolved solids concentration increases rapidly during the early period of runoff, but will then decrease after the initial flushing of salts has taken place. During less intense, low-flow events, the dissolved solids concentration generally increases in the downstream reaches. In streams where base flows are responsible for a very small part of overall streamflow, flushing of salts by floods appear to be the major mechanism by which dissolved solids are transported from the basin. The flushing action is a process that affects the quality of plains streams of southwestern Wyoming (Lowham et al. 1982). In less arid areas, less evaporation and more frequent flushing of accumulated salts would generally result in lower dissolved solids concentrations throughout the year. Due to the erosive nature of the area, relatively high-suspended sediment concentrations are also expected.

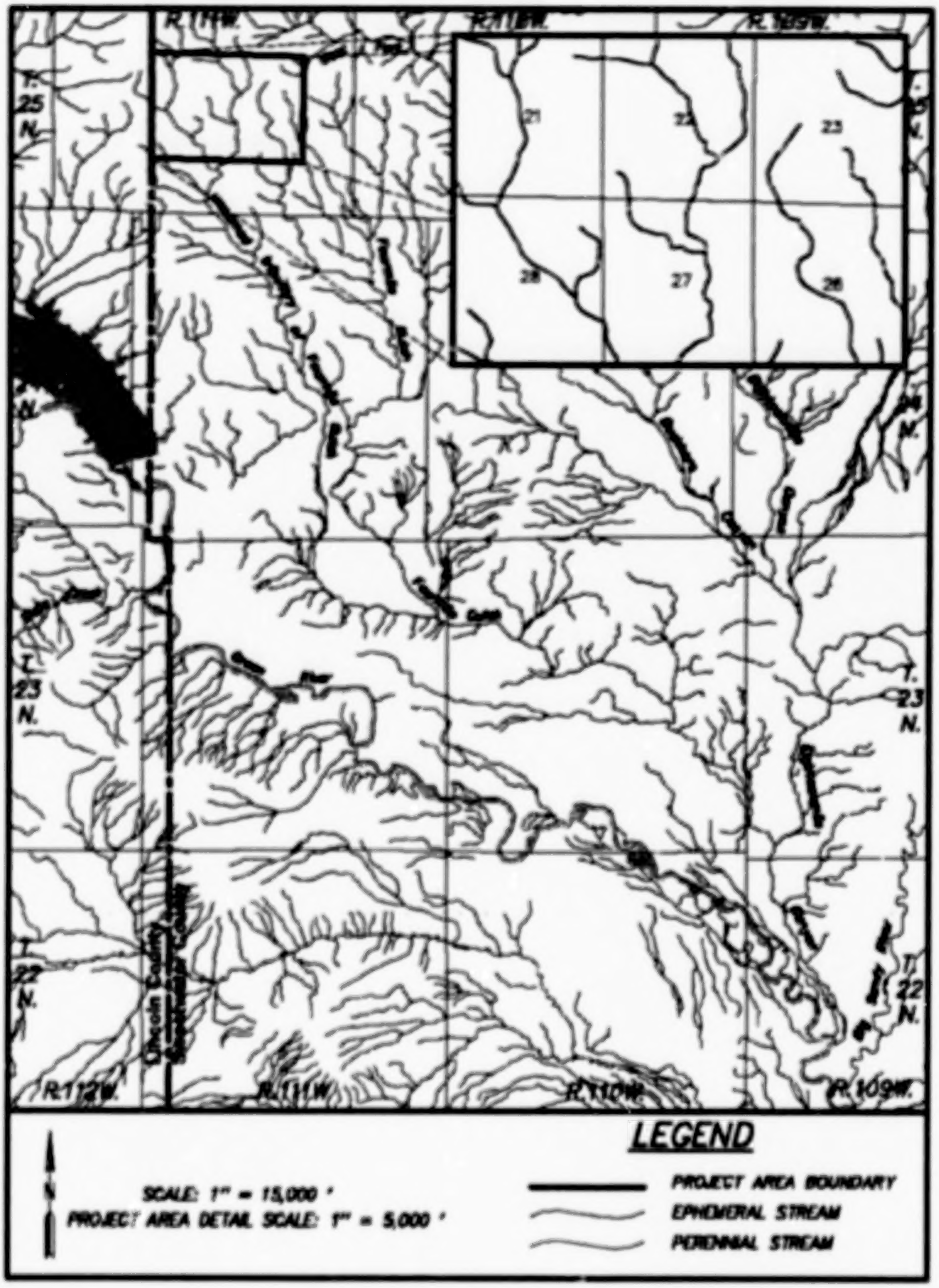

Figure 3-4. Surface Water Features in LMPA

As indicated in the previous section, there are no established USGS surface water quality sampling stations within the project area. The surface water quality in the Green River drainage basin, in general, is addressed in several reports published by the USGS (i.e., DeLong 1977, DeLong and Wells 1988, Ringen 1984). Suspended sediments, dissolved solids, and salinity are the constituents that are primarily evaluated, as they are typically indicators for the evaluation of water for various uses. These reports also relate streamflow discharge to these constituents. The USGS has collected monthly surface water quality samples from the Green River just below Fontenelle Reservoir at Station 09211200 from 1967 through the present. These samples have been analyzed for the major inorganic constituents, nutrients, and sediment concentrations during various times over the period of record. Samples currently collected are being analyzed for nutrients, pH, specific conductance, temperature, dissolved oxygen, and total dissolved solids (TDS) concentration (USGS 2003). In general, surface water quality data for the Green River just below Fontenelle Reservoir indicate that the waters are of good quality. TDS concentrations are typically between 200 to 300 mg/L, pH around 8.5, calcium and bicarbonate the dominant ions, and total suspended sediment (TSS) concentrations (analyzed from 1975 through 1978) are very low, seldom exceeding 10 mg/L.

Miscellaneous grab samples were collected by Western Wyoming College from the Green River downstream of the Eighteenmile Canyon confluence, but upstream of the Big Sandy River confluence in Section 29, T22N:R109W (Figure 3-3). These samples, collected in 1976 and 1977, had a TDS concentration of 164 and 324 mg/L, and a pH of 8.7 and 8.3, respectively. The BLM collected a miscellaneous surface water grab sample from Eighteenmile Canyon in August 1976 at a location approximately two miles upstream of the Green River confluence. The flow was reported to be just 0.3 cfs, the TDS concentration was 4,290 mg/L, with sodium (944 mg/L) and sulfate (2,330 mg/L) the dominant ions (WDRS 2003). Although no other site-specific data are available for the general area, surface water, when available, should be suitable for wildlife and livestock watering, industrial, and agricultural uses.

Point pollution sources have not been documented in the project area, and if they have occurred, they were probably accidental and of limited areal extent and of short duration. The primary non-point pollution source is natural erosion of geologic units. Grazing, oil and gas development, and poor road construction may further increase the high erosion rates described in the Soils Section.

The Wyoming Department of Environmental Quality (WDEQ) classifies Wyoming surface water resources according to quality and degree of protection (WDEQ 2001). Four classes have been identified as follows:

Class 1. Those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. Nonpoint sources of pollution shall be controlled through implementation of appropriate best management practices. Considerations employed during the designation of these waters include water quality, aesthetic, scenic, recreational, ecological, agricultural, botanical, zoological, municipal, industrial, historical, geological, cultural, archaeological, fish and wildlife, the presence of significant quantities of developable water and other values of present and future benefit to the people.

Class 2. Those surface waters other than Class 1 determined to be presently supporting game fish or drinking water supplies or where these uses are attainable.

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Class 3. Those surface waters, other than those classified as Class 1, that because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning. Class 3 waters provide support for invertebrates, amphibians or other flora and fauna which inhabit water at some stage of their life cycles. Generally, Class 3 waters have wetland characteristics, which are a primary indicator used in identifying Class 3 waters.

Class 4. Those surface waters, other than those classified as Class 1, where it has been determined that aquatic life uses are not attainable.

Fourmile Gulch, Buckhorn Canyon, and Eighteenmile Canyon are all Class 3 surface waters. All tributaries of these streams including those within the project area, are undesignated and by default take on the classification of the stream they run into. The entire Green River below New Fork River has been designated a Class 2 surface water.

The Wyoming Game and Fish Department (WGFD) has also classified surface waters in regard to the quality of trout fishing (WGFD 1991). Fourmile Gulch, Buckhorn Canyon, and Eighteenmile Canyon are Class 5 streams (incapable of supporting fish). The Green River below Fontenelle Dam to the Flaming Gorge Reservoir is a Class 2 stream (very good trout waters).

Salinity. A primary water quality concern is increased salinity levels in area surface waters. Salinity has been noted as a key factor that limits water use and is a concern relative to downstream water uses. Salinity has become a major concern within the Colorado River drainage basin. The 1972 Clean Water Act required the establishment of numeric criteria for salinity for the Colorado River. In 1973, seven Colorado River basin states created the Colorado River Basin Salinity Control Forum. The Forum developed water quality standards for salinity including numeric criteria and a basin-wide plan of implementation. The plan consists of a number of control measures to be implemented by State and Federal agencies. In 1974, Congress enacted the Colorado River Basin Salinity Control Act. The Act was amended in 1984. The amendments required the Secretary of Interior to develop a comprehensive program to minimize contributions from lands administered by the BLM.

Moderately erosive and saline soils naturally occur within and around the project area. Saline soils are associated with parent material from sedimentary rocks of the Tertiary Green River Formation. Once the soil is disturbed (i.e., from construction of a road or well pad), the potential for the release of residual soil sediment is increased. It is possible that oil and gas activities in the general area have and will continue to contribute to both sedimentation and salinity levels presently being experienced in the Green River. All of the soils within the project area have the potential of creating water quality-related sediment and salinity problems when disturbed.

The project area is situated at the headwaters of Eighteenmile Canyon and is approximately 28 miles from the watershed's confluence with the Green River. As shown in Figure 3-3, no surface runoff from the project area drains directly into the Green River. In addition, the project area covers only six square miles, or roughly 1.5 percent, of the entire Eighteenmile Canyon watershed area. Water quality deteriorates within ephemeral streams with increasing watershed area due to increased salinity contributions from the flushing of salts from normally dry surfaces. Intense storms can cause saline runoff, but since streams in the area are ephemeral, this source has only a temporary effect on water quality.

3.4.2.3 Waters of the U.S.

Most of the surface water features in the project area qualify as Waters of the United States. Waters of the U.S. include the territorial seas; interstate waters; navigable waterways (such as lakes, rivers, and streams), special aquatic sites, and wetlands that are, have been, or could be used for travel, commerce, or industrial purposes; tributaries; and impoundments of such waters. All channels that carry surface flows and that show signs of active water movement are waters of the U.S. Similarly, all open bodies of water (except ponds and lakes created on upland sites and used exclusively for agricultural and industrial activities or aesthetic amenities) are waters of the U.S. (EPA 33 CFR § 328.3(a)). The EPA and COE regulate such areas. Any activity that involves discharge of dredge or fill material into or excavation of such areas is subject to regulation by the COE pursuant to Section 404 of the CWA. Activities that modify the morphology of stream channels are also subject to regulation by the Wyoming SEO. Special aquatic sites and wetlands are discussed in greater detail in the Vegetation Wetlands and Noxious Weeds Section (Section 3.5).

3.4.3 Groundwater

Groundwater resources include deep and shallow, confined and unconfined aquifers. The project area occurs in the Colorado Plateau and Wyoming Basin groundwater regions described by Heath (1984); and the Upper Colorado River Basin groundwater region described by Freethey (1987). Lowham et al. (1985) discusses regional aquifer systems within the Green River basin. Evaluations of hydrogeology specific to the Green River basin and the Overthrust Belt of southwestern Wyoming are discussed by Welder (1968) and Ahern et al. (1981). In addition, an investigation of groundwater resources within Lincoln County, Wyoming by Eddy-Miller et al. (1996) is applicable to the project area. No groundwater data that are site-specific to the project area are currently available, although some miscellaneous information from water wells located within the Eighteenmile Canyon watershed (WRDS 2003) was used in the following discussion.

3.4.3.1 Location and Quantity

Several rock units can be classified as water-bearing zones (aquifers) within the Green River structural basin of southwestern Wyoming. As described in Table 3-7, these aquifers vary in thickness, potential well yields, and water quality. Not all of the geologic formations listed in Table 3-7 are encountered within the project area (Geology Section 3.1). The only geologic unit that outcrops within the project area is the Laney Shale Member of the Green River Formation. The Wasatch Formation, which underlies the Green River Formation, is the most extensive water-bearing formation in the Green River basin. However, the Wasatch Formation is deeply buried directly beneath the general project area. Rocks of Tertiary age are widely distributed in the Green River basin, and most wells and springs produce and issue from the Green River and Wasatch Formations and their members (Eddy-Miller et al. 1996). The Green River and Wasatch Formations generally contain groundwater under artesian conditions (Welder 1968). The Wasatch Formation is the source of water for a number of named and unnamed springs in the vicinity of the project area.

Welder (1968) stated that recharge to groundwater reservoirs in the Green River basin is principally from the infiltration of precipitation (direct rainfall, overland flow, and snow melt). However, most of the precipitation leaves the area as surface runoff before it can infiltrate. Groundwater is discharged mainly by the intersection of the water table with the land surface, evapotranspiration, inflow to streams and lakes, and discharge from pumping wells. Evaporation in this arid area removes more water from the basin than any other means of discharge. Discharge via water wells and transpiration by plants is not significant (Welder and McGreevy 1966). Springs and seeps occur where the local water table intersects the land surface, or where fractures and faults that act as groundwater conduits intersect the land surface. Groundwater movement within the Green River basin is basically toward the center of the basin.

According to Lowham et al. (1985), wells completed in the Green River Formation within the Green River basin yield up to 300 gpm, with a median yield of 10 gpm. Pumped discharge from wells completed in the Wasatch Formation within the basin ranges from 0.5 to 688 gpm, with a median discharge of 22.2 gpm. Flowing wells yield 0.2 to 550 gpm, with a median flow of 15 gpm (Lowham et al. 1985). Most water wells are completed in sandstone aquifers at depths of less than 500 feet. The uses for the water include stock, domestic, monitoring, and miscellaneous uses. The static water level in the wells varies greatly, but is generally less than 200 feet below ground level.

A recent (February 2003) SEO records review revealed that there is currently one active groundwater permit in the project area. The facility (Little Colorado Well #5) is located at the NW¼SE¼ of Section 22, T.25N., and R.111W. This 760-feet deep well is used for livestock watering, the static water level is 155 feet below ground surface, and according to the SEO records, it yields 18 gpm.

3.4.3.2 Quality

Groundwater quality is largely related to the depth of the respective source aquifer and the rock type. The quality of water in the various geologic formations underlying the Green River basin ranges from very poor to excellent (Welder 1968). In general, groundwater in the basin becomes more mineralized and therefore more saline and of higher TDS concentration with increased depth.

Large dissolved solids concentrations are present in most wells and springs; however, wells and springs nearer the mountain recharge areas generally have better quality water. Water from less than 50 percent of the wells and springs in the Green River basin have TDS concentrations within the 500 mg/L maximum concentration recommended by the National Secondary Drinking Water Regulation (Lowham et al. 1985). The secondary regulations are not mandatory and are often exceeded. The dissolved solids criterion for livestock is much less stringent than for domestic uses and concentrations of less than 5,000 mg/L generally are suitable for livestock.

Again, there are no site-specific data available for the project area, although the USGS (Eddy-Miller et al. 1996) compiled a large database of samples collected from aquifers within Lincoln and Sweetwater Counties. TDS concentrations of groundwater samples from the Wasatch Formation within Lincoln County ranged from approximately 200 mg/L to 5,400 mg/L. Those samples that were collected from springs near the recharge area were of a calcium carbonate type with a TDS less than 300 mg/L, whereas those samples collected farther away from the recharge area were of a sodium sulfate type with a TDS concentration over 1,000 mg/L. As reported by Eddy-Miller et al. (1996), the TDS concentrations of groundwater samples from members of the Tertiary Green River Formation in Lincoln County ranged from approximately 200 mg/L to 4,500 mg/L. Samples from the Laney Shale Member exhibited a mean TDS

Table 3-7. Hydrostratigraphy of Geologic Units in the Green River Basin and Overthrust Belt of Southwest Wyoming[1]

ERA	PERIOD	GEOLOGIC UNIT	THICKNESS (ft)	HYDROLOGIC PROPERTIES
Cenozoic	Quaternary	Alluvium	<100 thick in Green River basin; up to 410 feet thick in Bear River Valley of Overthrust Belt.	• Highly permeable, productive water-bearing deposits. • Well yields commonly 50 to 500 gpm. • Transmissivity generally 5,000 to 30,000 gpd/ft. • Total dissolved solids are generally less than 500 mg/L.
	Tertiary	Miocene and Pliocene sediments including Bishop Conglomerate, Browns Park, South Pass, Camp Davis, Salt Lake, and Teewinot Formations.	0-6,000	• Poorly consolidated conglomerates are well drained. • Yields generally range from 10 to 120 gpm. • Maximum reported spring discharge from Salt Lake Formation is 8,000 gpm. • Three transmissivity calculations range from 1,000 to >100,000 gpd/ft. • Total dissolved solids generally less than 500 mg/L.
		Fowkes Formation	0-2,600	• Locally yields water to wells and springs in Overthrust belt. • One Fowkes spring discharges 125 gpm.
		Bridger Formation	0-2,300	• A major aquifer in eastern Green River basin - Overthrust belt. • Yields from wells and springs commonly range from 2 to 100 gpm. • Transmissivities are commonly between 500 and 3,000 gpd/ft.
		Green River Formation (including Laney, Wilkins Peak, Angelo and Fossil Butte Members)	100-2,800	• A major aquifer in eastern Green River basin. • Sandstone lenses in Laney Shale generally yield 3 to 100 gpm to wells and springs. • Transmissivities range from 1,000 to 6,500 gpd/ft. • Vertical permeability is very low due to great thickness of tight marlstone and shale above and below sands. • Total dissolved solids concentrations in Laney Shale usually exceed 1,500 mg/L. • Wilkins Peak TDS levels are typically 10,000 to 100,000 mg/L.
		Wasatch Formation	2,500 to 7,200	• Major aquifer of Green River basin. • Well yields range from 1 to 1,300 gpm, though commonly less than 50 gpm. • Transmissivity generally ranges from 200 to 1,000 gpd/ft. • Oil field pay zone porosity and permeability range from 20 to 25 percent and 0.02 to 18 gpd/ft^2, respectively. • Total dissolved solids concentrations between 300 and 1,000 mg/L may be expected.

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ERA	PERIOD	GEOLOGIC UNIT	THICKNESS (ft)	HYDROLOGIC PROPERTIES
Cenozoic	Tertiary	Fort Union Formation	0-6,000	• Locally utilized aquifer of Green River basin and southern Overthrust belt. • Oil and gas field data indicate pay zone porosities of 9 to 23 percent and sandstone permeability of <.01 to 0.5 gpd/ft^2.
Cenozoic-Mesozoic	Tertiary- Upper Cretaceous	Evanston Formation	1,350-2,900	• Conglomerates and conglomeratic sandstones present in the Overthrust belt are capable of yielding moderate to large quantities of water to wells. • Yields to two Evanston wells are 3 and 200 gpm. • An estimated 1,000 gpm flows from one Evanston spring.
Mesozoic	Upper Cretaceous	Adaville Formation	1,400-5,000	• Generally considered a minor aquifer of the Overthrust belt area, though no well data or spring yield records exist for the unit.
		Blind Bull Formation	<9,200	• Small quantities of water are available from sandstone layers.
		Hilliard Shale Baxter Shale	3,000- 6,800?	• Major regional confining unit of Green River basin and Overthrust belt area. • Locally yields small quantities to wells from sand lenses. • Oil field pay zone porosity is 10 to 21 percent.
		Frontier Formation	1,100-3,000?	• Aquifer yields 5 to 50 gpm to springs. • Porosity of oil field pay zones is 8 to 25%. • Transmissivities from drill stem tests generally less than 10 gpd/ft. • Variable cementation and lenticularity of beds causes irregular occurrence of high transmissivity zones.
		Sage Junction Formation	<3,300	• Few hydrologic data are available. • Based on lithologies, small quantities of water are probably available from sandstone layers.
	Lower Cretaceous	Aspen Shale	400-2,200	• Locally utilized aquifer, maximum spring and well yields 25 to 30 gpm. • Oil field pay zone porosity of 15 percent in "fractures". • Water yields are mainly from stray sands and fracture zones.
		Quealy Formation	500-1,100	• Few hydrologic data are available. • Based on lithologies, water is probably not available from this unit.

ERA	PERIOD	GEOLOGIC UNIT	THICKNESS (ft)	HYDROLOGIC PROPERTIES
		Wyan Formation	<3,900	• Unknown
Mesozoic	Lower Cretaceous	Cokeville Formation	850-3,000	• Few hydrologic data are available. • Based on lithologies, small quantities of water are probably available from sandstone layers.
		Bear River Formation	800-1,500	• Minor aquifer with spring yields generally 4 to 15 gpm and similar well yields. • Oil field pay zone porosity is 8 to 21 percent. • Pump test transmissivities are 300, 2,300, 9,500 gpd/ft (specific capacities 0.3, 2.3, and 7.8 gpm/ft), calculated drill stem test transmissivity generally less than 45 gpd/ft. • Porosity and permeability are highest in the "Muddy" and "Dakota" members.
		Thomas Fork Formation	400-1,700	• Few hydrologic data are available. • Based on lithologies, small quantities of water are probably available from sandstone layers.
		Smiths Formation	300-850	• Few hydrologic data are available. • Based on lithologies, small quantities of water are probably available from sandstone layers.
		Gannett Group (includes Smoot Formation, Draney Limestone, Bechler Conglomerate, Peterson Limestone, Ephraim Conglomerate)	800-5,000	• Water-bearing units restricted to sandstones and conglomerate in lower part. • Transmissivity estimate of 160 gpd/ft for the Bechler Member. • Springs in Bechler conglomerate member flow 5 to 75 gpm.
	Upper Jurassic	Stump Sandstone-Preuss Redbeds	270-460	• Unit is considered a poor aquifer with one well yield of 5 gpm and spring flows of 20 and 50 gpm. • Transmissivities estimated from 3 drill stem tests are less than 12 gpd/ft.
	Middle Jurassic	Twin Creek Limestone	800-3,800	• Minor aquifer in Overthrust belt. • Spring flows range from 20 to 300 gpm. • Transmissivity estimates range from less than 1 to 16 gpd/ft. • Permeability is generally less than 0.002 gpd/ft^2 and porosity from one oil field pay zone is 1.7 percent.

ERA	PERIOD	GEOLOGIC UNIT	THICKNESS (ft)	HYDROLOGIC PROPERTIES
	Lower Jurassic	Nugget Sandstone	750-1,300	• Major aquifer of Mesozoic system. • Springs flow 3 to 300 gpm with four flows of 1,400 to 2,000 gpm. • Well yields not available. • Transmissivity estimates range from 9 to 37 gpd/ft in the Green River Basin and 1.9 to 186 in the Overthrust belt.
Mesozoic	Triassic	Ankareh Formation	200-800	• Minor regional aquifer, locally confining. • One spring flows 200 gpm. • No current well production. • Transmissivity from one drill stem test is 0.5 gpd/ft.
		Thaynes Limestone	1,100-2,600	• Generally considered a regional aquifer with spring flows of 5 to 1,800 gpm (4 less than 100 gpm) and one well flowing 150 gpm. • Oil field pay zone porosity at one field is less than 5 percent. • Transmissivity estimates from 3 oil field drill stem tests are 0.3 to 38 gpd/ft. • The unit is most productive where solution openings, bedding plane partings, and fractures exist.
		Woodside Formation	350-600	• Unit acts as regional aquitard. • Well and spring data not available.
		Dinwoody Formation	250-700	• Regional aquitard with local productive zones. • One spring flows 150 gpm. • Transmissivity estimate from one drill stem test is 8.8 gpd/ft.
Paleozoic	Permian	Phosphoria Formation	200-400	• Unit is minor aquifer, locally confining. • One well and one spring yield 200 and 300 gpm, respectively. • Transmissivity estimates typically less than 13 gpd/ft. • Most productive from fracture zones and interbedded sandstones in the upper part of the formation.
	Pennsylvanian	Tensleep Sandstone (includes Wells Formation)	450-1,000	• Major aquifer of Paleozoic System. • Well yields range from 210 to 700 gpm. • Spring flows are commonly less than 210 gpm. • Transmissivity estimates from 11 drill stem tests are 0.14 to 38 gpd/ft. • Good interstitial permeability and excellent secondary permeability where fractured.

ERA	PERIOD	GEOLOGIC UNIT	THICKNESS (ft)	HYDROLOGIC PROPERTIES
	Mississippian-Pennsylvanian	Amsden Formation	400-700	• Minor aquifer in Green River basin, but locally confining in Overthrust belt. • One Amsden well yields 8 gpm. • Oil field pay zone porosity at 3 fields is 7 to 12 percent. • Transmissivity estimates from 4 drill stem tests are less than 1 to 4.8 gpd/ft. Permeability is less than 0.02 gpd/ft^{2}.
Paleozoic	Mississippian	Madison Limestone	800-2,000	• Major regional aquifer. • Excellent solution and fracture permeability. • Maximum well yield of 720 gpm, though most yields are less than 100 gpm. • Four springs flow less than 350 gpm, two others flow 4,000 and 40,000 gpm. • Transmissivity is typically less than 15,000 gpd/ft. • Specific capacity generally 0.1 to 10 gpm/ft.
	Devonian-Mississippian	Darby Formation	400-1,000	• Major aquifer with permeability dependent upon degree of fracturing and secondary solution, best developed in Overthrust belt. • Four Darby springs flow 5 to 1,100 gpm. • One well yields more than 5 gpm.
	Ordovician	Bighorn Dolomite	400-1,000	• Highly productive aquifer where fracture, secondary solution and bedding plane permeability are well developed. • Three Bighorn springs flow 250 to 450 gpm, one flows 3,200 gpm. • Porosity from one oil field is 2 percent. • Well data are not available.
	Cambrian	Gallatin Limestone	125-1,000	• Well and spring data not available; however, lithology as well as fracture and secondary solution permeability development are indicative of a potentially productive aquifer.
		Gros Ventre Formation	500-2,500	• Unit is generally considered a regional aquitard with low vertical permeability due to upper and lower shales. • Well data are not available.
		Flathead Sandstone	175-200	• Well and spring data are not available for the unit. • Lithology is similar to basal Cambrian in other basins of western Wyoming where Flathead equivalents are highly permeable, productive aquifers.

1 - Adapted from Ahern, et al. (1981) and Eddy-Miller, et al. (1996).

concentration of 860 mg/L and were of a sodium-bicarbonate type. In addition, a search of the Wyoming Water Resources Data System (WRDS 2003) was conducted for the analyses of groundwater samples collected from any wells located near the project area. The search revealed the chemical analyses of samples collected by the USGS from seven wells completed in the Laney Shale Member. These wells are all located in the northwestern corner of Sweetwater County, but none are closer than about six miles to the project area. These samples had TDS concentrations ranging from 311 mg/L to 26,525 mg/L, and the dominant ions are sodium, bicarbonate, and sulfate. Miscellaneous samples have been collected by the USGS from three wells completed in the Wasatch Formation in the same general area and the TDS concentrations ranged from 704 mg/L to 1,053 mg/L.

Groundwater within the Green River basin occurs under both water table and confined (artesian) conditions. The unconfined aquifers are generally the unconsolidated Quaternary age alluvial deposits and some of the thicker and widespread consolidated formations of Tertiary age. Groundwater movement within these unconfined aquifers is generally downslope and follows the drainages. The Green River, Wasatch, and older formations are generally under artesian pressure and the confining beds restrict the movement of groundwater between aquifers, hence, movement of potential contaminants between aquifers. Individual aquifers within the Green River basin may differ greatly between thickness and areal extent, although they are probably interconnected enough to allow some degree of hydrologic connection (Welder 1968). Due to the numerous faults within the Overthrust Belt, groundwater movement is difficult to define (Eddy-Miller et al. 1996). Concerns have been raised for several gas field projects in southwestern Wyoming regarding groundwater quality degradation due to the piercing of confining layers and vertical and horizontal migration and mixing of water of variable qualities. Data suggesting this is a current problem in the project area are not available. Improperly completed wells could be a potential source of contamination between aquifers.

3.5 VEGETATION, WETLANDS AND NOXIOUS WEEDS

3.5.1 General Vegetation

Vegetation on the LMPA is dominated by Wyoming big sagebrush/mixed grass prairie and desert shrub communities. The project area is located within the Green River and Great Divide Basin (7" - 9") Precipitation Zone, Region 4 (USDA-SCS 1986). Accordingly, native plants in this area of southwestern Wyoming are primarily xeric-adapted, drought-tolerant low shrub, grass, and flowering forb species.

3.5.1.1 Vegetation Cover

A vegetation cover-type map of the project area (Figure 3-5) was provided by the Wyoming Geographic Information Science Center (WYGISC 2003) and used to calculate areas and boundaries of primary and secondary land cover types. Information for secondary vegetation types and plant species of concern was also provided by the Wyoming Natural Diversity Database (WYNDD 2002).

Based upon the Wyoming Gap Analysis Program (GAP, Merrill et al. 1996), Wyoming big sagebrush was classified as the primary cover type (100%) on the project area. Two secondary cover types were also classified: desert shrub populations (13.8%) on the western half of the area with the remainder of the area classified as mixed grass prairie (86.2%) (Table 3-8).

Table 3-8. Vegetation Cover Types on the Little Monument Project Area As Identified by the Wyoming GAP Analysis Program (Merrill et al. 1996).

	Primary		**Secondary**	
Vegetation Cover Type	Acres	Percent	Acres	Percent
Wyoming big sage	3857.0	100	-	-
Desert shrub	-	-	533.5	13.8
Mixed grass prairie	-	-	3323.5	86.2
TOTAL	3857.0	100.0	3857.0	100.0

Wyoming big sagebrush: Wyoming big sagebrush (*Artemesia tridentada* ssp.*wyomingensis*) is the dominant cover type on the project area, covering 3,857.0 acres (100%). The description of this cover type from the Wyoming GAP analysis is as follows (Merrill et al. 1996): "Total shrub cover in this type comprises more than 25% of the total vegetative cover. This type is variable in Wyoming and ranges from dense, homogeneous Wyoming big sagebrush to sparsely vegetated arid areas where Wyoming big sagebrush is the dominant shrub. Often, patches of Wyoming big sagebrush are found with patches of mixed grasses. In these cases the type is classified as Wyoming big sagebrush steppe if the sagebrush patches occupy more than 50% of the total landscape area and as mixed grass if the grasses occupy more than 50% of the total area."

Resolution of upland land surface area of the GAP layer is approximately 100 hectares (248 acres), therefore, smaller stands of some secondary cover-types such as basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and cushion plant communities, although present, may fail to appear on the map and their extent cannot be calculated.

Mixed grass prairie: This is a "catch-all" type for grasslands that contain a mixture of short grass and tall grass prairie species. These grasslands do not contain buffalo grass, considered an indicator of short grass prairie. Mixed grass prairie often occurs in patches intermixed with shrub species such as sagebrush. Dominant plant species in this cover type include: thickspike wheatgrass (*Agropyron dasystachyum*), western wheat grass (*Agropyron smithii*), bottlebush squirreltail (*Sitanion hystrix*), needle-and-thread (*Stipa comata*), Indian ricegrass (*Oryzopsis hymenoides*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Agropyron spicatum*), and threadleaf sedge (*Carex filifolia*). Forbs and especially woody crowned half-shrubs such as Hood's phlox (*Phlox hoodii*), Hooker's sandwort (*Arenaria hookeri*), cushion wild buckwheat (*Eriogonum ovalifolium*), green rabbitbrush (*Chrysothamnus viscidiflorus*), winterfat (*Eurotia lanata*), and broom snakeweed (*Gutierrezia sarothrae*) occur in some locations as understory dominants with the sagebrush. These sites are usually alkaline with limited permeability, and often occur on thin soils with rocky or gravelly subsurface materials. Locoweed (*Oxytropis* spp.) and milkvetch (*Astragulus* spp.) are poisonous plants often occurring with this cover type (Merrill et al. 1996).

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Desert shrub: This type is a "catch-all" for a mixture of shrubs usually associated with dry, saline habitats. Shrub cover is often dominated by alkaline/saline adapted species such as shadscale saltbush (*Atriplex confertifolia*), but can be a mixture of Gardner's saltbush (*Atriplex gardneri*), greasewood (*Sarcobatus vermiculatus*) and/or desert cushion plants (Merrill et al. 1996).

3.5.1.2 Biological Soil Crusts

An often overlooked, but extremely vital component of Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are the biological soil crusts that occupy most of the open space not occupied by vascular plants. Biological soil crusts predominantly are composed of cyanobacteria (formerly blue-green algae), green and brown algae, mosses, and lichens (Belnap et al. 2001). Liverworts, fungi, and bacteria can also be important components. Because they are concentrated in the top 1-4 mm of soil, they primarily affect processes that occur at the soil surface or soil-air interface and include soil stability, atmospheric N-fixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seeding germination, and plant growth (Belnap et al. 2001). Crusts are well adapted to severe growing conditions, but poorly adapted to compressional disturbances such as trampling by humans and livestock, wild horses, wildlife, or vehicles driving off roads. Disruption of the crusts decreases organism diversity, soil nutrients, stability, and organic matter (USGS 2002).

3.5.2 Waters of the United States, Including Wetlands

Wetlands are unique and important due to their relative rarity in the arid West, their functional role in and as components of hydrologic systems, their unique and important wildlife habitat and forage value, their heritage value, and their protection and regulation under the CWA.

The Green River RMP (USDI-BLM 1997) defines wetlands as lands transitional between terrestrial and aquatic systems where the water is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominately hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year. The most common wetland classification system used in Wyoming is the Cowardin System (Cowardin et al. 1979). Under this system, all wetlands in Wyoming belong to one of three different inland systems: (1) Palustrine (marsh or pond-like), (2) Lacustrine (lake-like), or (3) Riverine (river-like).

The location and classification of potential wetlands in the project area were determined from a draft USFWS National Wetlands Inventory (NWI) map (Figure 3-6) provided by the WYGISC (2003). Two man-made wetlands are located in the eastern one-half of the project area: one in Section 23, T25N:R111W and the other in Section 26, T25N:R111W. The Cowardin System classifies these locations as: (1) PUSCx (Palustrine, unconsolidated shore, seasonally flooded/excavated), and (2) PUBFx (Palustrine, unconsolidated bottom, excavated). There are no PEMC (Palustrine, emergent, seasonally flooded) wetlands in the area which are usually associated with irrigated meadows and hay fields. The linear wetlands shown in Sections 21 and 22 are classified as Riverine, intermittent streambed, temporarily flooded. All drainages in the Upper Green-Slate watershed, such as the two linear systems shown, eventually drain into the Green River (WDEQ 2001).

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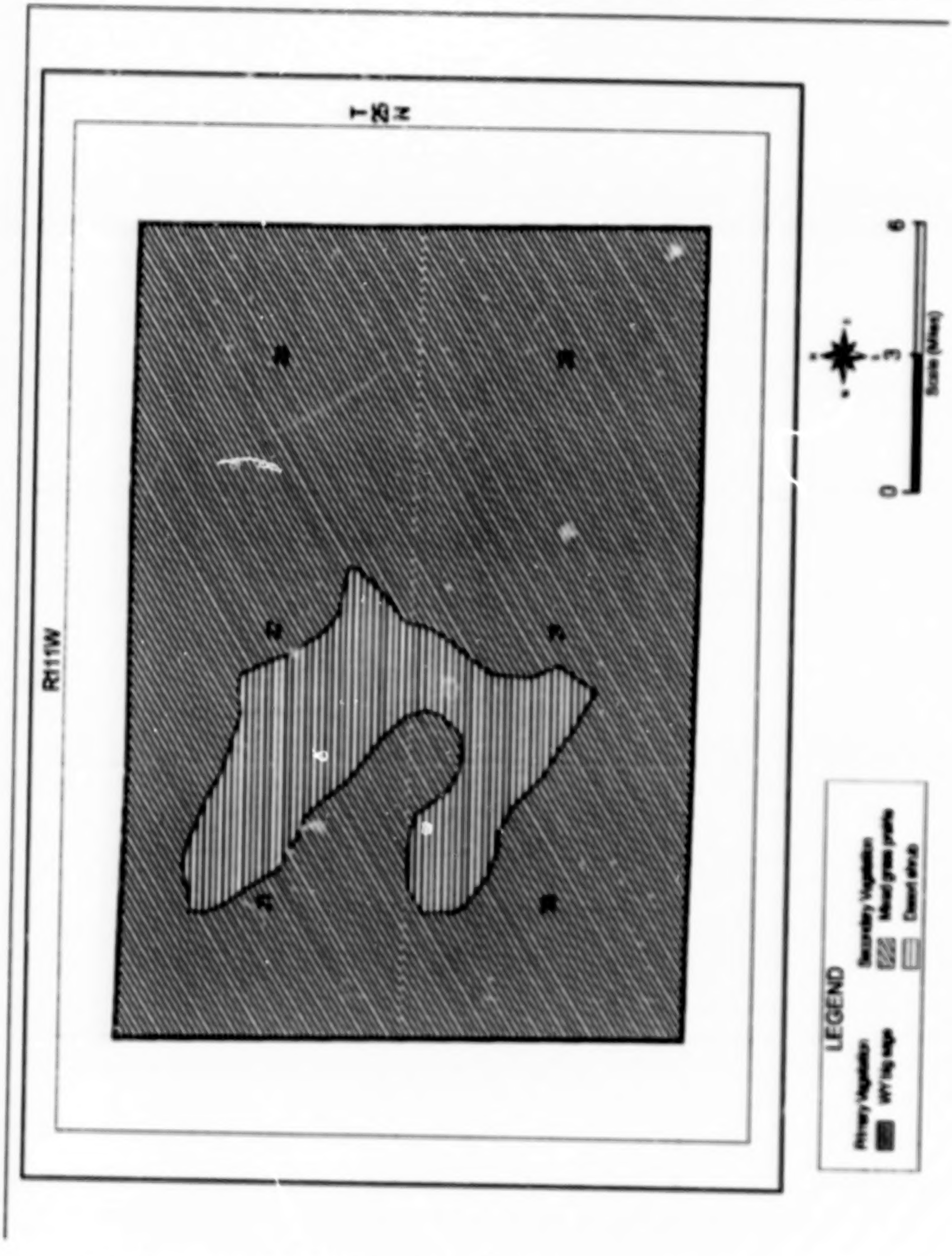

Figure 3-5. Vegetation Cover Types on the Little Monument Project Area.

3.5.3 Noxious Weeds

On 3 February 1999, Executive Order (EO) 13112 ("Invasive Species") was signed by President Clinton. The primary purpose of this EO is to prevent the introduction of invasive species and provides for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. In Wyoming, some 428 taxa have been documented as invasive (Hartman and Nelson 2000). Of these 428 taxa, 22 are designated as noxious by the State of Wyoming (Rice 2002) and are shown in Table 3-9.

Noxious weeds are very aggressive and invading infestations tend to exclude other native plant species thereby reducing the overall forage production of desirable shrubs, herbaceous grasses and forbs. The project area is vulnerable to infestations of noxious weeds, especially on newly disturbed surfaces. Current drought conditions in Wyoming (NOAA 2003) increase the probability that noxious weeds may become established in stressed or disturbed habitats.

Table 3-9. Designated Noxious Weeds in Wyoming.[1]

Scientific Name	Common Name
Agropyron repens	Quackgrass
Ambrosia tomentosa	Skeletonleaf bursage
Arctium minus	Common burdock
Cardaria draba, C. pubescens	Hoary cress, whitetop
Carduus acanthoides	Plumeless thistle
Carduus nutans	Musk thistle
Centaurea diffusa	Diffuse knapweed
Centaurea maculosa	Spotted knapweed
Centaurea repens	Russian knapweed
Chrysanthemum leucanthemum	Ox-eye daisy
Cirsium arvense	Canada thistle
Convolvulus arvensis	Field bindweed
Cynoglossum officinale	Houndstongue
Euphorbia esula	Leafy spurge
Isatis tinctoria	Dyers woad
Lepidium latifolium	Perennial pepperweed
Linaria dalmatica	Dalmatian toadflax
Linaria vulgaris	Yellow toadflax
Lythrum salicaria	Purple loosestrife
Onopordum acanthium	Scotch thistle
Sonchus arvensis	Perennial sowthistle
Tamarisk spp.	Salt cedar

[1] Designated Noxious Weeds, Wyoming Stat. § 11-5-102 (a)(xi) and Prohibited Noxious Weeds, Wyoming Stat. § 11-12-104.

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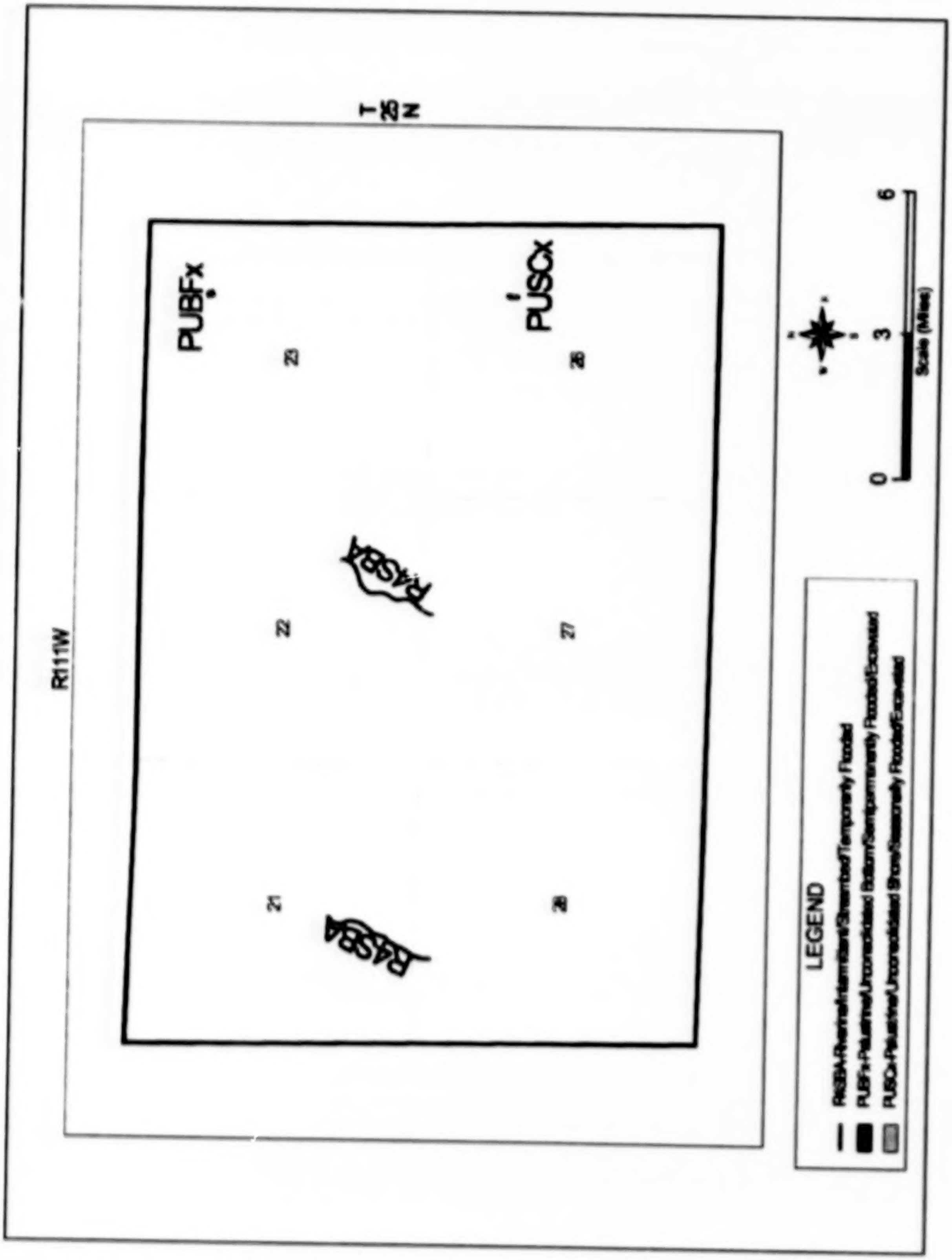
R111W
T23N
PUBFx
PUSCx
R4SBA
R4SBA
21
22
23
28
27
26
LEGEND
R4SBA-Riverine/Intermittent/Streambed/Temporarily Flooded
PUBFx-Palustrine/Unconsolidated Bottom/Semipermanently Flooded/Excavated
PUSCx-Palustrine/Unconsolidated Shore/Seasonally Flooded/Excavated
0
3
6
Scale (Miles)

Figure 3-6. Wetland Cover Types on the LMPA.

3.6 RANGE RESOURCES

The LMPA is located within the Eighteen Mile grazing allotment (No. 13017) which encompasses a total of about 245,659 acres; of which, 228,841 acres (93%) are managed by the BLM; 14,896 acres (6%) by the Bureau of Reclamation; and 1,922 acres (1%) by the State of Wyoming. Land surface area of the LMPA represents about 1.3% of the total land area of the Eighteen Mile allotment. A total of 18,925 permitted AUM's are authorized by the BLM for the allotment. However, this total may be reduced, especially in drought years, to protect the rangeland resource (Pers. Comm. Jay D'Ewart 2003). An AUM is defined in the Green River RMP (USDI-BLM 1997) as the amount of forage required to sustain one mature cow or the equivalent based on an average daily forage consumption of 26 pounds of dry matter per day for one month (780 pounds per month). The grazing ratio on the Eighteen Mile allotment is about 13 acres per AUM. Eight livestock operators currently hold permits to run either sheep or cattle on the federal portions of the allotment (Pers. Comm. Jay D'Ewart 2003).

3.7 WILDLIFE AND WILD HORSES

3.7.1 Introduction

The LMPA lies within the BLM's Green River Resource Area administered by the RSFO. Objectives for wildlife management on the resource area are directed by the Record of Decision of the Green River RMP (USDI-BLM 1997). The RMP provides for multiple use planning and management of public lands and resources in a combination designed to meet present and future needs.

The project area is small (3,857 acres) relative to the overall size of the resource area (5.36 million acres), yet this area provides diverse habitat that supports a wide variety of resident, migrant, and seasonally resident wildlife species. Because many wildlife species are highly mobile and can readily move in and out of the project area, records of current and historical wildlife species occurrences were obtained for the project area and a six-mile zone surrounding it. Since activities within the permit area could potentially affect nesting raptors and sage grouse breeding activities that are outside the project area, the area of analysis was expanded for these species to include a two-mile buffer zone.

Information concerning current and historical wildlife locations was obtained from several sources. Information regarding sage grouse lek and raptor nest locations was obtained from the RSFO. Additional information was acquired from the Wyoming Game and Fish Department (WGFD) Wildlife Observation System (WOS). This listing contains records for all types of wildlife (birds, mammals, reptiles, amphibians). The *Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming* (WGFD 1999) was also used to assess the potential occurrence of species in the project area. This atlas divides Wyoming into 28 degree blocks, and the presence or absence and breeding activity of vertebrate species are documented by degree block. The project area is located in degree blocks 15 and 16. A species was considered to have the potential for occurrence in the project area if it was reported as observed, breeding, or historically present within degree blocks 15 or 16. Annual big game herd unit reports from the WGFD were also used. Finally, data was acquired from Wyoming Natural Diversity Database (WYNDD). Location records for vertebrate species of special concern (federal or state) within a township buffer of the project area were obtained from WYNDD (2002). Although wild horses are not managed as a wildlife species by the WGFD and BLM, they are included in the wildlife sections of this document.

3.7.2 Wildlife Habitat

Wildlife habitats that could be affected by the project include both the areas which would be physically disturbed by the construction of gas wells, related roads, pipelines, and production facilities, as well as zones of influence surrounding them. Zones of influence are defined as those areas surrounding, or associated with, project activities where impacts to a given species or its habitat could occur. The shape and extent of such zones varies with species and circumstance.

One primary wildlife habitat is found in the project area. This primary habitat type, Wyoming big sagebrush steppe, corresponds with the vegetation cover types described in Section 3.5 of this document.

3.7.3 General Wildlife

A total of 367 species has been recorded on or proximal to the project area either as residents or migrants and includes 78 mammal species, 277 bird species, 5 amphibian species, and 7 reptile species (Appendix A). The presence of these wildlife species was determined solely from the sources of information discussed in Section 3.7.1.

Although all species in Appendix A are important members of a functioning ecosystem and wildlife community, most are common and have wide distributions in the region. Consequently, the relationship of most of these species to the proposed project are not discussed in the same depth as species which are threatened, endangered, rare, of special concern, of special economic interest, or are otherwise of high interest or unique value.

3.7.4 Big Game

Four big game species: mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), pronghorn antelope (*Antilocapra americana*), and moose (Alces alces) occur on the project area. Big game populations are managed by the WGFD within areas designated as herd units and are discussed in that context.

The types of big game habitat designated by WGFD (1996, 2002a), and discussed in this document, include winter, yearlong, winter/yearlong, crucial winter, crucial winter/yearlong, spring/summer/fall, and out (or non-use areas). Winter ranges are used by a substantial number of animals during winter months (December through April). Winter/yearlong ranges are occupied throughout the year but during winter they are used by additional animals that migrate from other seasonal ranges. Yearlong ranges are occupied throughout the year and do not receive an influx of animals during winter. Crucial range (i.e. crucial winter, and crucial winter/yearlong) describes any seasonal range or habitat component that has been documented as a determining factor in a population's ability to maintain itself at a specified level (theoretically at or above the population objective) over the long term. Crucial ranges are typically used 8 out of 10 winters. Spring/summer/fall ranges are used before and after winter conditions persist. Areas designated as OUT (or non-use areas) contain habitats of limited importance to the species.

Mule Deer. The project area lies within the Sublette Herd Unit. This unit covers 6,519 square miles of habitat in Sublette, Sweetwater, Fremont, Lincoln, and Teton counties (WGFD 1996). The 2001 posthunt population estimate for the herd unit was 34,700, well above the herd objective of 32,000 animals (WGFD 2002a). The project area is located within hunt area 138; 2001 hunter success in this area was 36.7% with a harvest of 296 mule deer bucks. Approximately 10% of the mule deer harvest in the Sublette Herd Unit was from hunt area 138 in 2001(WGFD 2002a). The Little Monument Project Area lies entirely within a portion of the herd unit which is classified as OUT (or non-use areas) containing habitats of limited importance to the species. As such, this document will not discuss mule deer further.

Elk. The project area lies within the 2,491.8-square mile Pinedale Herd Unit. The population objective for this herd unit is 1,900 and the 2001 posthunt estimated population was 1,926 animals (WGFD 2002a). The project area is located in hunt area 98, and in 2001 hunter success in this area was 33.6% with a harvest of 112 adult males, 24 yearling males, 34 juveniles, and 227 females. The LMPA lies entirely within a portion of the herd unit which is classified as OUT (or non-use areas) containing habitats of limited importance to the species. Therefore, elk will not be discussed further in this document.

Pronghorn Antelope. The project area lies within the Sublette Herd Unit. This unit occupies most of the Green River drainage north of Interstate 80 as well as portions of the Gros Ventre, Hoback and Sweetwater drainages. Some antelope in this herd unit migrate farther than any other known herd in North America (WGFD 2002b). The Sublette Herd Unit covers 10,546 square miles (11% of the state of Wyoming), and pronghorn occupy 7,983 square miles within the herd unit. The population objective for this herd unit is 48,000 and the 2001 posthunt population estimate was 47,700. Due to its large size, the Sublette Herd Unit is divided into 3 sub-units (North, South and West) for the purpose of analyzing data and making management recommendations on a more local level (WGFD 2002b). The LMPA is located within the North sub-unit which has the same geographic extent as hunt areas 85-90. In 2001, 1,346 antelope were harvested in the North sub-unit with a hunter success of 95%. All of the project area (3,857 acres) is classified as spring/summer/fall pronghorn range which is used before and after winter conditions persist (Figure 3-7).

Moose. The project area lies partially within the 5,804.5-square mile Sublette Herd Unit. The 2001 postseason population estimate for the herd unit (5,665) exceeds the population objective of 5,500 moose (WGFD 2002a). The project area is located within moose hunt area 25, and in 2001 hunter success in this hunt area was 91.6% with a harvest of 57 bulls, 42 females, and 10 juveniles. Approximately 128 acres (3.3%) of the project area lies within the Sublette Herd Unit. The remainder of the project area (3,729 acres) lies outside of any existing moose herd unit. The portion within the Sublette Herd Unit is classified as OUT (or non-use areas), containing habitats of limited importance to the species. Therefore, moose will not be discussed further in this document.

Big Game Summary. Overall, the project area is in habitats of limited importance to three of the four big game species (mule deer, elk, and moose). Maps of these herd units in relation to the project area can be found in Appendix B. The entire project area provides spring/summer/fall habitat for pronghorn antelope, which is used before and after winter conditions persist.

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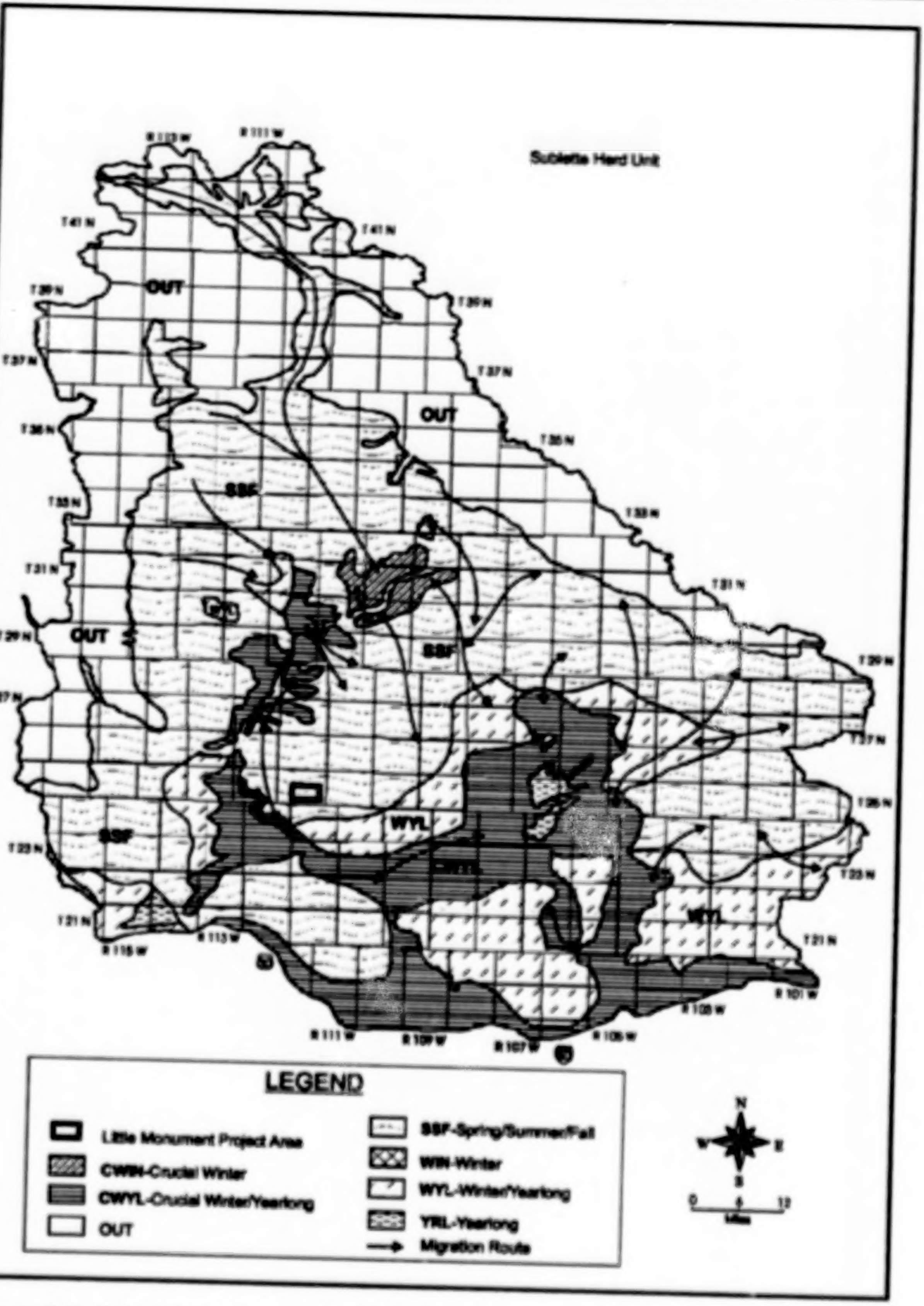

Figure 3-7. Sublette Pronghorn Herd Unit Seasonal Ranges in Relation to the LMPA.

3.7.5 Wild Horses

The proposed Little Monument project area lies within the Little Colorado Wild Horse Herd Management Area (HMA) which encompasses about 519,541 acres of BLM-administered public lands and represents about 0.7% of the total land surface area of the HMA. The majority of the HMA consists primarily of consolidated public lands with state school sections, and a large portion to the south belonging to the Bureau of Reclamation (Lloyd 2003). Boundaries of the Little Colorado HMA are the Big Sandy River on the south and the Green River on the west. The northern boundary is the Pinedale/Rock Springs Field Office boundary and Highway 191 establishes the eastern boundary. The area is unfenced except for portions of boundary fence between the RSFO and the Pinedale Field Office (PFO) management areas, and along Highway 191.

The BLM establishes an appropriate management level (AML) for each HMA. The AML is the population objective for the HMA that will ensure a thriving ecological balance among all the users and resources of the HMA. The Little Colorado HMA has an appropriate management level of 69- 100 horses. The population is currently estimated to be 123 horses according to a June 2003 census. With no known natural predators, the historical annual rate of increase in wild horse populations in the RSFO area is about 20 percent (USDI-BLM 1999a). The only human-made hazards to wild horses in the project area of importance would be fences, however, minimal fencing exists in the HMA and is mostly associated with deeded property or associated with major highways (i.e., Highway 191).

3.7.6 Upland Game Birds

The greater sage-grouse and mourning dove are the only upland game bird species known to occur on or around the project area, which lies within the Eden Upland Game Management Area (UGMA # 7).

Greater Sage-grouse. The greater sage-grouse is the upland game bird of primary interest in the project area. The RSFO of USDI BLM lists the greater sage-grouse as a sensitive species. The sage-grouse has declined over much of its range in the western states during recent years and may be petitioned for listing under the ESA by the USFWS. Populations in Wyoming have recently been in a decline due to a wide range of possible factors including drought, habitat loss, and habitat degradation.

The project area is located within the extensive sagebrush steppe habitat of southern Wyoming where sage-grouse are common. Important habitats for sage-grouse are strutting grounds (leks), nesting areas, brood-rearing areas, and wintering areas. All of these sage-grouse habitats may occur in a contiguous or patchy and disconnected pattern. Leks may be located between summer and winter ranges, but in some cases, summer and winter ranges may be the same (Call and Maser 1985). According to Call (1974), Braun et al. (1977), and Hayden-Wing et al. (1986), preferred nesting habitat is usually located within two miles of leks.

The estimated sage-grouse harvest in UGMA # 7 in 2001 was 2,456 sage-grouse, roughly 19.3% of the statewide harvest (WGFD 2002c). According to the RSFO, there are no known sage-grouse leks on or within two miles of the project area. The nearest known lek lies approximately ten miles to the north of the project area.

Mourning Dove. Mourning doves are found in the project area during the spring and summer months (WGFD 2002c) and are associated with sagebrush-grass, mountain shrub, and riparian habitats. Brood production is tied closely to spring and summer precipitation. Availability of sufficient seeds and water likely increases mourning dove productivity. The estimated mourning dove harvest for UGMA # 7 in 2001 was 560 (WGFD 2002c) out of 29,075 for the entire state.

3.7.7 Waterfowl and Shorebirds

Primary use of the project area by waterfowl and shorebirds is minimal because of the small amount of open water and wetlands available (Section 3.5.2). Although the habitat for waterfowl and shorebirds is quite limited in the project area, there is a possibility of incidental use by a number of different species because of suitable habitat within the region (Fontenelle Reservoir and Green River are approximately 3.5 miles west of the project area).

3.7.8 Raptors

According to the WOS data (WGFD 2002d), 12 raptor species have been observed on or within six miles of the Little Monument Project Area: bald eagle (*Haliaeetus luecocephalus*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), merlin (*Falco columbarius*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*), and Swainson's hawk (*Buteo swainsoni*). Data from the RSFO show no records of raptor nests on or within two miles of the project area (surveys done in 2000 and 2001).

3.8 SPECIAL STATUS WILDLIFE, FISH, AND PLANT SPECIES

Special status species include: (1) threatened, endangered, candidates, or those petitioned for listing as threatened or endangered by the FWS under the Endangered Species Act (ESA) of 1973, as amended; and (2) those designated by the BLM State Director as sensitive (USDI-BLM 2002).

3.8.1 Threatened, Endangered or Proposed for Listing Species of Wildlife, Fish, and Plants

The FWS has determined that one mammal, three birds, four fish, and one plant species listed as either threatened, endangered, candidate or proposed under the ESA may potentially be found in the project area or be affected by activities conducted on the project area (USDI-FWS 2002a). These species and their federal status under the ESA are listed in Table 3-10. The black-footed ferret, bonytail, Colorado pikeminnow, humpback chub, and razorback sucker are listed as endangered. The yellow-billed cuckoo is a candidate for listing as endangered under the ESA, and the bald eagle and Ute ladies'-tresses are classified as threatened. Four endangered fish species, which are downstream residents of the Colorado River System, are included in this analysis because of potential impacts to their habitat.

3.8.1.1 Mammals

Black-footed Ferret and Associated White-tailed Prairie Dog Colonies. The black-footed ferret's original distribution in North America closely corresponded to that of prairie dogs (Hall and Kelson 1959, Fagerstone 1987). In Wyoming, white-tailed prairie dog (*Cynomys leucurus*) colonies provide essential habitat for black-footed ferrets. Ferrets depend almost exclusively on prairie dogs for food and they also use prairie dog burrows for shelter, parturition, and raising their young (Hillman and Clark 1980, Fagerstone 1987). Based upon communications with the RSFO and a query of species locations from the WYNDD (2002) and the WOS (WGFD 2002d), no white-tailed prairie dog colonies exist on the project area. Therefore, no habitat for black-footed ferrets exists within the LMPA. The BLM has made a "no effect" determination for presence of black-footed ferrets. Black-footed ferrets will not be given further consideration in this analysis.

3.8.1.2 Birds

Bald Eagle. Bald eagles typically build stick nests in the tops of coniferous or deciduous trees along streams, rivers, or lakes. Selection of nests likely depends upon availability of food in the early nesting season (Swenson et al. 1986). The habitat on the project area lacks large perennial water bodies and nesting trees for bald eagles, therefore nesting on the project area is not likely. Wintering areas are typically associated with concentrations of food sources including major rivers that remain unfrozen where fish and waterfowl are available and ungulate winter ranges where carrion is available. One record of bald eagle occurrence within six miles of the project area was recorded in the WOS in August, 1987 (WGFD 2002d) and according to RSFO, the nearest roosting habitat is approximately seven miles northwest of the LMPA, on the Green River. Although bald eagles could occasionally fly over or utilize the project area for hunting, this species would not be affected. Thus, the BLM has made a "no effect" determination and this species will not be given further consideration in this analysis.

Table 3-10. Threatened, endangered, proposed, and candidate species potentially Affected by or present on the Little Monument Project Area (USDI-FWS2002a)

Species	Scientific Name	Status
Mammals		
Black-footed ferret	*Mustela nigripes*	Endangered
Birds		
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Yellow-billed Cuckoo	*Coccyzus americanus*	Candidate
Fish		
Bonytail	*Gila elegans*	Endangered
Colorado pikeminnow	*Ptychocheilus lucius*	Endangered
Humpback chub	*Gila cypha*	Endangered
Razorback sucker	*Xyrauchen texanus*	Endangered
Plants		
Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened

Yellow-billed Cuckoo. The yellow-billed cuckoo is a neotropical migrant that winters primarily in South America and migrates north into the United States during April and May. The yellow-billed cuckoo feeds primarily on large insects: caterpillars, katydids, cicadas, grasshoppers, and

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crickets. Occasionally small frogs, lizards, eggs, and young birds are eaten (Hughes 1999). It is a riparian obligate species that requires at least 25 acres of mature riparian woodland, especially cottonwood (*Populus* spp.) or willow (*Salix* spp.) with low, dense undergrowth at elevations below 7,000 feet. The cuckoo prefers 100 acres or more of deciduous woodland at least 100 meters wide. Marginal habitat is at least 10 acres of riparian habitat more than 50 meters in width. Nests are located less than 8 meters above the ground in at least 2.5 acres of dense deciduous vegetation near water (Cerovski et al. 2001).

Due to the lack of adequate habitat on the project area and the fact that no records are documented within six miles of the project area (WGFD 2002d, WYNDD 2002) it is unlikely that the yellow-billed cuckoo occurs on the project area. This species will not be considered further in this analysis.

3.8.1.3 Fish Species

The project area is located in the Green River drainage of southwest Wyoming. The project area is drained by intermittent/ephemeral streams fed primarily by runoff of winter snows. Four federally endangered fish species may occur as downstream residents of the Colorado River system: bonytail, Colorado pikeminnow, humpback chub, and razorback sucker (USDI-FWS 2002a). However, these fish species are likely extirpated from the Colorado River system above Flaming Gorge Dam on the Green River (Baxter and Stone 1995). None of these four endangered fish species are likely to be found in streams and tributaries within the project area. However, the potential for project-related impacts (water quality or quantity reduction) to waters that feed into the Green River warrant their inclusion in this NEPA document.

Bonytail. Habitat of the bonytail is primarily limited to narrow, deep canyon-bound rivers with swift currents and white water areas (Valdez and Clemmer 1982, Archer et al. 1985, Upper Colorado River Endangered Fish Recovery Program 2002). Little is known about the specific habitat requirements of bonytail but it is thought that flooded bottomland habitats are important nursery and growth areas for young. Adults reach a maximum size of 550 mm (21.7 in) in length and 1.1 kg (2.4 lbs) in weight (USDI-FWS 2002b). With no known reproducing populations in the wild, the bonytail is thought to be the rarest of the endangered fishes in the Colorado River Basin. The bonytail was historically found in portions of the upper and lower Colorado River basins. Today, in the upper Colorado River Basin, only small, disjunct populations of bonytail are thought to exist in the Yampa River in Dinosaur National Monument, in the Green River at Desolation and Gray canyons, and in the Colorado River at the Colorado/Utah border and in Cataract Canyon (Upper Colorado River Endangered Fish Recovery Program 2002).

Colorado Pikeminnow. The Colorado pikeminnow is the largest member of the minnow family and occurs in swift, warm waters of Colorado Basin rivers. Adults attain a maximum size of approximately 1.8 meters (5.9 feet) in length and 36 kg (79.4 lbs) in weight (USDI-FWS 2002c). The species is adapted to rivers with seasonally variable flow, high silt loads, and turbulence. Pools and eddies outside the main current are used by adult pikeminnow. Backwater areas are inhabited by young-of-the-year. The species was once abundant in the main stem of the Colorado River and most of its major tributaries throughout Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, California, and Mexico. Today the species is primarily limited to the Green River below its confluence with the Yampa River; the lower Duchesne River in Utah; the Yampa River below Craig, Colorado; the White River from Taylor Draw Dam near Rangely, downstream to the confluence with the Green River; the Gunnison River in Colorado; and the

Colorado River from Palisade, Colorado, downstream to Lake Powell (Upper Colorado River Endangered Fish Recovery Program 2002); and there are small numbers of wild individuals, with limited reproduction, in the San Juan River subbasin. The Colorado pikeminnow has been reintroduced into the Gila River subbasin, where it exists in small numbers in the Verde River (USDI-FWS 2002c).

Humpback Chub. Humpback chub are restricted to deep, swift, canyon regions of the mainstem and large tributaries of the Colorado River Basin. Adults attain a maximum length of 480mm (18.9 in) and 1.2 kg (2.6 lbs) in weight (USDI-FWS 2002d). Historically, the humpback chub inhabited the canyons of the Colorado River and four of its tributaries: the Green, Yampa, White, and Little Colorado rivers. Now, two relatively stable populations are found in Westwater Canyon, Utah and Black Rocks, Colorado. Smaller numbers have been found in the Yampa and Green Rivers in Dinosaur National Monument, Desolation and Gray canyons on the Green River in Utah, Cataract Canyon on the Colorado River in Utah, and the Colorado River in Arizona. The largest known population is in the Little Colorado River in the Grand Canyon, where there may be up to 10,000 fish. There are no population estimates available for the rest of the upper Colorado River Basin (Upper Colorado River Endangered Fish Recovery Program 2002).

Razorback Sucker. The razorback sucker, an omnivorous bottom feeder, is one of the largest fishes in the sucker family reaching a length of 1 meter (3.3 ft) in length and 5-6 kg (11-13 lbs) in weight (USDI-FWS 2002e). Adult razorback sucker habitat use varies depending on season and location. Adults are adapted for swimming in swift currents, but they may also be found in eddies and backwaters away from the main current. Young require nursery habitats consisting of quiet, warm, shallow water, such as backwaters or inundated floodplains, river tributary mouths, and coves and shorelines in reservoirs (USDI-FWS 2002e). This species was once widespread throughout most of the Colorado River Basin from Wyoming to Mexico. Today, in the upper Colorado River Basin, populations of razorback suckers are only found in the upper Green River in Utah, the lower Yampa River in Colorado and occasionally in the Colorado River near Grand Junction. Small numbers of razorback suckers have also been found in Lake Powell, San Juan River, and Colorado River (Upper Colorado River Endangered Fish Recovery Program 2002).

3.8.1.4 Plant Species

Ute ladies'-tresses. The Ute ladies'-tresses (*Spiranthes diluvialis*), a threatened species, is a perennial, terrestrial orchid, endemic to moist soils near wetland meadows, springs, lakes, and perennial streams. It occurs generally in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows at elevations from 4,200 to 7,000 feet. The orchid colonizes early successional riparian habitats such as point bars, sand bars, and low lying gravelly, sandy, or cobbly edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. It is known to occur in a number of locations in Daggett County, Utah, with the closest being about 90 miles south of the project area. Other known locations include along the Snake River in Idaho, and more than 100 miles south of the Rock Springs area. According to the RSFO, suitable habitat for this species on the LMPA is not present. Therefore, the BLM has made a "no effect" determination. This species will not be given further consideration in this document.

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3.8.2 Sensitive Wildlife, Fish, and Plant Species

Although these species have no legal protection under the ESA, the BLM and FWS still maintain an active interest in their numbers and status. Sensitive species are those included on the BLM Wyoming State sensitive species list (USDI-BLM 2002). The BLM views "management of sensitive species as an opportunity to practice pro-active conservation; this management should not be onerous, or a show-stopper of other legitimate, multiple use activities" (USDI-BLM 2002). The BLM's order of priority for the management of all special status species is: First - listed T&E species; Second - proposed T&E species; Third - candidate T&E species; Fourth - BLM sensitive species; and, Fifth - State listed species. The BLM Wyoming Sensitive Species list is meant to be dynamic, and the list will be reviewed annually. The plant, wildlife, and fish species and their sensitivity status/rank, and probability of occurrence in the LMPA are listed in Table 3-11. A summary discussion of these species follows. In addition, the RSFO identified several of these species to be considered in more detail.

3.8.2.1 Mammals

Nine sensitive mammal species may potentially be found on the LMPA (USDI-BLM 2002, Table 3-11). These include: Idaho pocket gopher, Wyoming pocket gopher, pygmy rabbit, white-tailed prairie dog, swift fox, spotted bat, fringed myotis, long-eared myotis, and Townsend's big-eared bat. The RSFO identified three of these species that should be considered in more detail: swift fox, Wyoming pocket gopher, and pygmy rabbit.

Swift Fox. The swift fox inhabits short grass and mid-grass prairies over most of the Great Plains including eastern Wyoming (Clark and Stromberg 1987). In eastern Wyoming and portions of northeastern Colorado, the species is most common in areas with relatively flat to gently rolling topography (Fitzgerald et al. 1994, Olson 2000). Swift foxes prey on a variety of small rodents, lagomorphs, birds, and insects (Cutter 1958, Olson 2000). This species has been studied in Wyoming (Olson 2000), and recent surveys conducted by Woolley et al. (1995) show that it is much more widely distributed in Wyoming than previously thought. Woolley's studies have documented occurrences in northeastern Sweetwater County but his study area did not include the Little Monument Project Area in northwestern Sweetwater County. Olson et al. (1997) ran track plots and conducted spotlight surveys which included BLM Road No. 4202, where it passes through the western edge of the project area. No swift fox were reported during the 1997 surveys on or in the vicinity of the project area (Olson et al. 1997).

No records of swift fox were documented in the WOS (WGFD 2002d) or WYNDD (WYNDD 2002) within six miles of the project area, however, the WGFD conducted a trapper survey in 1995 resulting in some reported sightings west of the Fontenelle Reservoir (Woolley et al. 1995). Although the majority of the project area is not ideal habitat, some portions of the project area may provide limited foraging habitat for swift fox.

Wyoming Pocket Gopher. Little is known about the Wyoming pocket gopher. The species is the only mammal restricted to Wyoming, and the only known populations occur in the southcentral portion of the state (Clark and Stromberg 1987).

Like all pocket gophers, the Wyoming pocket gopher spends most of its life underground. The species is frequently found along dry ridge tops and is associated with gravelly, loose soils and greasewood vegetation communities (*Sarcobatus* spp.) (Clark and Stromberg 1987). Within these habitats, the Wyoming pocket gopher digs two types of tunnels: (1) deep burrows with chambers used for shelter, nesting, food storage, and deposition of fecal material, and (2) long, winding, and shallow tunnels used to forage roots, tubers, and other vegetation material from above (Nowak 1999). The shallow food tunnels are often visible from the ground surface and are useful in detecting the presence of pocket gophers. The limited behavioral information available on the species suggests that except during the breeding season, Wyoming pocket gophers lead solitary lives with only one individual per burrow system (Nowak 1999).

Limited potential habitat exists within the project area for Wyoming pocket gophers. Although the species has not been documented within a six-mile radius of the project area (WGFD 2002d, WYNDD 2002), its fossorial behavior does make the Wyoming pocket gopher difficult to detect.

Pygmy Rabbit. The former range of the pygmy rabbit was thought to be limited to portions of Idaho and Utah until their presence was confirmed in southwest Wyoming (Campbell et al. 1982). Pygmy rabbit sightings were documented by Hayden-Associates (HWA) in 1994, south of Fontenelle Reservoir in eastern Lincoln and western Sweetwater Counties (HWA 1994). Pygmy rabbits are limited to areas of dense and tall big sagebrush in predominantly sandy soils (Campbell et al. 1982, Clark and Stromberg 1987, Heady et al. 2002). Burrows are located in areas with greater cover, higher shrub density, taller vegetation, and greater forb cover (Heady et al. 2002).

No pygmy rabbit records within six miles of the project area were documented in the WOS (WGFD 2002d) or the WYNDD (WYNDD 2002). The project area is primarily dominated by Wyoming big sagebrush and it is possible that pygmy rabbits could occur on the project area.

3.8.2.2 Birds

Thirteen sensitive bird species may potentially be found on the LMPA (USDI-BLM 2002, Table 3-11). These include: sage sparrow, Brewer's sparrow, long-billed curlew, sage thrasher, western burrowing owl, loggerhead shrike, greater sage-grouse (see Section 3.7.6), white-faced ibis, trumpeter swan, peregrine falcon, ferruginous hawk, mountain plover, and northern goshawk. The following species have been considered in more detail because of the possibility of occurrence on the LMPA: sage thrasher, loggerhead shrike, Brewer's sparrow, sage sparrow, mountain plover, and white-faced ibis.

Sage Thrasher. The sage thrasher generally occurs within shrub-dominated valleys and plains of the western United States and is considered a sagebrush (*Artemesia* spp.) obligate. Insects are the primary food source and foraging occurs almost exclusively on the ground. For successful breeding the sage thrasher requires large patches of sagebrush steppe habitat and typically nest in taller shrubs with wider crowns (Reynolds et al. 1999).

Suitable habitat exists in the area, however there are no records of sage thrashers occurring within six miles of the project area (WGFD 2002d). It is likely that sage thrashers use the larger patches of taller sagebrush within the project area.

Loggerhead Shrike. The loggerhead shrike is a small avian predator that hunts from perches and impales its prey on thorns, barbed wire fences, and other sharp objects (Yosef 1996). It prefers open country within close proximity to brushy areas containing trees or shrubs taller than six feet for nesting (Dinsmore 1983). It breeds in basin-prairie shrublands, sagebrush grasslands, mountain-foothills shrublands, pine-juniper woodlands, and woodland chaparral.

Brewer's Sparrow. Most Brewer's sparrows breed in the Great Basin area of the western United States and winter in the Sonoran and Chihuahuan deserts of southwestern United States and Mexico (Rotenberry et al. 1999). Breeding habitat is closely associated with landscapes dominated by Wyoming big sagebrush with an average nest - shrub height of 0.5 meters. Nests are located less than 1.2 meters high in live sagebrush or on the ground at the base of a live sagebrush shrub. The Brewer's sparrow is a common cowbird host and parasitized nests are sometimes deserted (Cerovski et al. 2001).

No records of Brewer's sparrows are documented within six miles of the project area (WGFD 2002d, WYNDD 2002). However, it is likely that Brewer's sparrows breed within the sagebrush

Table 3-11. Sensitive Wildlife, Fish, and Plant Species Potentially Present in the LMPA.[1]

Wildlife Species			
Common Name	**Scientific Name**	**Sensitivity Status[2]**	**Occurrence Potential[3]**
Mammals			
Idaho pocket gopher	*Thomomys idahoensis*	G4/S2?, NSS3	Unlikely
Wyoming pocket gopher	*Thomomys clusius*	R2, G2/S1S2, NSS4	Possible
Pygmy rabbit	*Brachylagus idahoensis*	G4/S2, NSS3	Possible
White-tailed prairie dog	*Cynomys leucurus*	G4/S2S3, NSS3	Unlikely
Swift fox	*Vulpes velox*	R2, G3/S2A3	Possible
Spotted bat	*Euderma maculatum*	R2/R4,G4/S1B, SZ?N, NSS2	Unlikely
Fringed myotis	*Myotis thysanodes*	R2, G5/S1B, S1N, NSS2	Unlikely
Long-eared myotis	*Myotis evotis*	G5/S1B, S1?N, NSS2	Unlikely
Townsend's big-eared bat	*Corynorhinus townsendii*	R2/R4, G4/S1B, S2N, NSS2	Unlikely
Birds			
Sage sparrow	*Amphispiza belli*	G5/S3B, SZN	Likely
Brewer's sparrow	*Spizella breweri*	G5/S3B, SZN	Likely
Long-billed curlew	*Numenius americanus*	G5/S3B, SZN, R2, NSS3	Unlikely
Sage thrasher	*Oreoscoptes montanus*	G5/S3B, SZN	Likely
Mountain Plover	*Charadrius montanus*	G2/S2B,SZN	Unlikely
Western burrowing owl	*Athene cunicularia*	R2, G4/S3B, SZN, NSS4	Unlikely
Loggerhead shrike	*Lanius ludovicianus*	G5/S4B, SZN, R2	Possible
Greater sage-grouse	*Centrocercus urophasianus*	G5/S3	Likely
White-faced ibis	*Plegadis chihi*	G5/S1B, SZN, R2, NSS3	Unlikely
Trumpeter swan	*Cygnus buccinator*	R2/R4, G4/S1B, S2N, NSS2	Unlikely
Peregrine falcon	*Falco peregrinus*	G4/T3/S1B, S2N, R2, NSS3	Unlikely
Ferruginous hawk	*Buteo regalis*	R2, G4/S3B, S3N, NSS3	Possible
Northern goshawk	*Accipiter gentilis*	R2/R4, G5/S23B, S4N, NSS4	Unlikely
Reptiles			
Midget-faded rattlesnake	*Crotalus viridis concolor*	G5T3/S1S2	Unlikely
Amphibians			
Boreal toad	*Bufo boreas boreas*	G4T4/S2, R2, R4, NSS2	Unlikely
Great Basin spadefoot toad	*Spea intermontanus*	G5/S4, NSS4	Possible
Northern leopard frog	*Rana pipiens*	G5/S3, R2, NSS4	Unlikely
Spotted frog	*Rana pretiosa*	G4/S2S3, R2, R4, NSS4	Unlikely
Fish			
Leatherside chub	*Gila copei*	G3G4/S2, NSS1	Unlikely
Roundtail chub	*Gila robusta*	G2G3/S2?, NSS1	Unlikely
Bluehead sucker	*Catostomus discobolus*	G4/S2S3, NSS1	Unlikely
Flannelmouth sucker	*Catostomus latipinnis*	G3G4/S3, NSS1	Unlikely
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	R2/R4, G4T2T3/S2, NSS2	Unlikely

Plant Species				
Common Name	**Scientific Name**	**Sensitivity Status[2]**	**Habitat**	**Occurrence Potential[3]**
Meadow pussytoes	*Antennaria arcuata*	GS/S2	Moist, hummocky meadows, seeps or springs surrounded by sage/grasslands 4,950-7,900'	low
Small rock cress	*Arabis pusilla*	G1/S1 Removed from Federal Candidate list 10/25/99	Cracks/crevices in sparsely vegetated granite/pegmalile outcrops within sage/grasslands 8,000-8,100'	low
Mystery wormwood	*Artemisia biennis var. diffusa*	G5T1/S1	Clay flats and playas 6,500'	low
Nelson's milkvetch	*Astragalus nelsonianus*	G2/S2 CO	Alkaline clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, and cushion plant communities at 5,200-7,600'	low
Precocious milkvetch	*Astragalus proimanthus*	G1/S1, BLM	Cushion plant communities on rocky, clay soils mixed with shale on summits and slopes of white shale hills at 6,800-7,200 feet.	low
Cedar Rim thistle	*Cirsium aridum*	G2Q/S2	Barren, chalky hills, gravelly slopes and fine textured, sandy-shaley draws 6,700-7.200'	possible
Ownbey's thistle	*Cirsium ownbeyi*	G3/S2	Sparsely vegetated shaley slopes in sage and juniper communities 6,440-8,400;	low
Wyoming tanseymustard	*Descurania torulosa*	G1/S1	Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone 8,300-10,000'	low
Large-fruited bladderpod	*Lesquerella macrocarpa*	G2/S2	Gypsum-clay hills and benches, clay flats, and barren hills 7,200-7,700'	low
Stemless beardtongue	*Penstemon acaulis var. acaulis*	G3T2/S1	Cushion plant or black sage grassland communities on semi-barren rocky ridges, knolls, and slopes at 6,500-7,000'	low
Beaver Rim phlox	*Phlox pungens*	G2/S2	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrates 6,000-7,600'	possible
Tufted twinpod	*Physaria condensata*	G2/S2	Sparsely vegetated shale slopes and ridges 6,500-7,000"	possible
Green River greenthread	*Thelesperma caespitosum*	G1/S1	White shale slopes and ridges of Green River Formation 6,300'	low
Uinta greenthread	*Thelesperma pubescens*	G1/S1 FSR4	Sparsely vegetated benches and ridges on coarse, cobbly soils of Bishop Conglomerate 8,500'	low
Cedar Mountain Easter daisy	*Townsendia mircrocephala*	G1/S1	Rocky slopes of Bishop Conglomerate 8,500'	low
Trelease's racemose milkvetch[4]	*Astragalus racemosus var. treleasei*	G5T2/S1	Habitat requirement research in progress	possible

[1] - Source: USDI-BLM (2002).

[2] - Definition of sensitivity status:

G Global rank: Rank refers to the range-wide status of a species.

T Trinomial rank: Rank refers to the range-wide status of a subspecies or variety.

S State rank: Rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.

1 Critically imperiled because of extreme rarity (often known from 5 or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.

2 Imperiled because of rarity (often known from 6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.

3 Rare or local throughout its range or found locally in a restricted range (usually known from 21-100 occurrences).

4 Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.

5 Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.

H Known only from historical records. 1950 is the cutoff for plants; 1970 is the cutoff date for animals.

X Believed to be extinct.

A Accidental or vagrant: A taxon that is not known to regularly breed in the state or which appears very infrequently (typically refers to birds and bats).

B Breeding rank: A state rank modifier indicating the status of a migratory species during the breeding season (used mostly for migratory birds and bats)

N Nonbreeding rank: A state rank modifier indicating the status of a migratory species during the non-breeding season (used mostly for migratory birds and bats)

ZN or ZB Taxa that are not of significant concern in Wyoming during breeding (ZB) or non-breeding (ZN) seasons. Such taxa often are not encountered in the same locations from year to year.

U Possibly in peril, but status uncertain; more information is needed.

Q Questions exist regarding the taxonomic validity of a species, subspecies, or variety.

? Questions exist regarding the assigned G, T, or S rank of a taxon.

R2 Designated sensitive in U.S. Forest Service Region 2 (Rocky Mountain Region).

R4 Designated sensitive in U.S. Forest Service Region 4 (Intermountain Region).

WGFD Native Species Status Codes - Fish and Amphibians

NSS1 - Populations are physically isolated and/or exist at extremely low densities throughout range. Habitats are declining or vulnerable. Extirpation appears possible. The Wyoming Game and Fish Commission mitigation category for Status 1 species is "Vital". The mitigation objective for this resource category is to realize "no loss of habitat function". Under these guidelines, it will be very important that the project be conducted in a manner that avoids alteration of habitat function.

NSS2 - Populations are physically isolated and/or exist at extremely low densities throughout range. Habitat conditions appear to be stable. The Wyoming Game and Fish Commission mitigation category for Status 2 species is also "Vital". The mitigation objective for this resource category is to realize "no loss of habitat function". Under these guidelines, it will be very important that the project be conducted in a manner that avoids alteration of habitat function.

NSS3 - Populations are widely distributed throughout its native range and appear stable. However, habitats are declining or vulnerable. The Wyoming Game and Fish Commission mitigation category for Status 3 species is "High". The mitigation objective for this resource category is to realize "no net loss of habitat function within the biological community which encompasses the project site". Under these guidelines, it will be important that the project be conducted in a manner that either avoids the impact, enhances similar habitat or results in the creation of an equal amount of similarly valued fishery habitat.

NSS4-7 - Populations are widely distributed throughout native range and are stable or expanding. Habitats are also stable. There is no special concern for these species.

WGFD Native Species Status Codes - Birds and Mammals

NSS1 - Populations are greatly restricted or declining, extirpation appears possible. AND On-going significant loss of habitat.

NSS2 - Populations are declining, extirpation appears possible; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance. OR Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; ongoing significant loss of habitat.

NSS3 - Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance. OR Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance. OR Species is widely distributed; population status or trends are unknown but are suspected to be stable; on-going significant loss of habitat.

NSS4 - Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance. OR Species is widely

distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance.
NSS5 - Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is stable and not restricted. OR Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance.
NSS6 - Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is stable and not restricted.
NSS7 - Populations are stable or increasing and not restricted in numbers and/or distribution; habitat is stable and not restricted.

[3] - Occurrence potential based upon presence of habitat, known distribution, and personal communications with RSFO biologists J. Dunder (wildlife) and J. Glennon (botany).
[4] BLM is updating the 2002 Sensitive Species List to reflect this addition (Glennon 2003).

habitats that exist on the project area. Nests are located 1-5 feet above the ground regardless of shrub height. The loggerhead shrike feeds primarily on grasshoppers and other large insects although some small mammals and birds are also taken. Areas of low vegetation or bare ground are preferred foraging habitat (Cerovski et al. 2001).

No records of loggerhead shrikes are documented within six miles of the project area (WGFD 2002d), but it is possible that loggerhead shrikes utilize portions of the project area during the nesting season.

Sage Sparrow. The sage sparrow prefers semi-open habitats with evenly spaced shrubs 1-2 meters high. Although closely associated with Wyoming big sagebrush, the sage sparrow will utilize sagebrush communities interspersed with other shrub species, such as bitterbrush (*Purshia tridentata*), saltbush (*Atriplex* spp.), shadscale (*Atriplex confertifolia*), rabbitbrush (*Chrysothamnus* spp.), or greasewood (Martin and Carlson 1998). Sage sparrows nest in shrubs up to one meter high and require a large block of unfragmented habitat to breed successfully (Cerovski et al. 2001).

No records of sage sparrows are documented within six miles of the project area (WGFD 2002d, WYNDD 2002). The project area is dominated by Wyoming big sagebrush and it is possible that sage sparrows occur on the project area.

Mountain Plover. The mountain plover nests over much of Wyoming, but its preferred habitat may be limited throughout its range in the state (Oakleaf et al. 1982, Dinsmore 1983, Leachman and Osmundson 1990). This ground-nesting species is typically found in areas of short (less than four inches) vegetation on slopes of less than three percent. Any short grass, very short shrub, or cushion plant community could be considered plover nesting habitat (Parrish et al. 1993), however, mountain plovers prefer shortgrass prairie with open, level or slightly rolling areas dominated by blue grama and buffalograss (Graul 1975, Dinsmore 1981, Dinsmore 1983, Kantrud and Kologiski 1982). These habitats are quite often associated with prairie dog colonies, and researchers have found that plovers use prairie dog colonies more often than other areas (Knowles et al. 1982, Knowles and Knowles 1984, Olson and Edge 1985). Loss of wintering and breeding habitats and prey-base declines from pesticide use are thought to be factors contributing to the decline of mountain plovers on the North American Continent (Wiens and Dyer 1975, Knopf 1994).

No mountain plover records within the six-mile buffer of the project area were reported in the WOS (WGFD 2002d) or WYNDD (WYNDD 2002). While not providing ideal mountain plover habitat, some portions of the project area may provide limited nesting opportunities for mountain plovers.

White-faced Ibis. White-faced ibis feed in wet meadows and shallow water found along streams and lakes. They nest in areas with extensive water, which is required for successful reproduction, and build their nests in heavy emergent vegetation such as cattail and reed (Erwin 1983).

Five records of white-faced ibis are documented within six miles of the project area (WYNDD 2002, WGFD 2002d). The few small ephemeral streams found within the project area would not provide suitable habitat for this species, therefore white-faced ibis are not expected to nest on the project area.

3.8.2.3 Reptiles

No records of midget-faded rattlesnakes are documented within six miles of the project area (WGFD 2002d, WYNDD 2002). They may potentially be found on the LMPA (USDI-BLM 2002, Table 3-11), but the likelihood is very low.

3.8.2.4 Amphibians

Four sensitive amphibian species may potentially be found on the LMPA (USDI-BLM 2002, Table 3-11). The boreal toad, northern leopard frog, and spotted frog are unlikely to occur on the LMPA; the Great Basin spadefoot toad has a slight potential to occur.

Great Basin Spadefoot Toad. In Wyoming the Great Basin spadefoot occurs in sagebrush communities mostly west of the Continental Divide (Baxter and Stone 1980). They are dormant in fall and winter and their emergence in spring may be triggered by moisture in the burrow. Spadefoots may extend their dormancy period during drought for long periods of time. Breeding occurs during spring and early summer in permanent and temporary waters, including playas that develop after heavy rains and spring runoff pools. Males usually emerge from burrows after spring rains to breed, although Great Basin spadefoots do breed during periods of no rain. The stimulus for emergence for breeding in the absence of rain is unknown. Adult spadefoots are opportunistic carnivores and emerge from their burrows at night to forage for insects, arachnids, and snails only when the air is humid enough for dew to collect or during light rains (Howard 1996).

The Great Basin spadefoot has not been documented within six miles of the project area (WGFD 2002d, WYNDD 2002). Although limited habitat exists in the area it is possible that Great Basin spadefoots occur on the project area and utilize the intermittent and temporary water sources for breeding during years with adequate moisture.

3.8.2.5 Fish

Five sensitive fish species may potentially be found downstream of the LMPA. These include: leatherside chub, roundtail chub, bluehead sucker, flannelmouth sucker, and Colorado River cutthroat trout. These species are unlikely to occur on the LMPA due to a lack of suitable habitat. However, they do occur downstream of the LMPA and are therefore considered in this document.

3.8.2.6 Plants

Sixteen BLM Wyoming state sensitive plant species may be found in the RSFO Area (USDI-BLM 2002). A summary of status, habitat associations, and potential of occurrence in the project area for these sensitive species is given in Table 3-11. Of these species, four have the potential to occur in the project area: Cedar Rim thistle (*Cirsium radium*), Beaver Rim phlox (*Phlox pungens*), tufted twinpod (*Physaria condensata*), and Trealease's racemose milkvetch (*Astragalus racemosus var. treleasei*).

Cedar Rim Thistle. This thistle can be found on barren, chalky hills, gravelly slopes, and fine-textured, sandy shaley draws between 6,700 and 7,200 ft.

Beaver Rim Phlox. Beaver Rim phlox prefers sparely vegetated slopes on sandstone, siltstone, or limestone substrates at elevations between 6,000 and 7,000 ft.

Tufted Twinpod. Tufted twinpod occurs in sparsely vegetated slopes and ridges between 6,500 and 7,000 ft.

Trealease's racemose milkvetch. This milkvetch occurs primarily in sparsely-vegetated outwash flats and fluted Badlands slopes at 6,500 to 7,500 ft. Most populations are found on pale whitish or grey silty loams derived from shales.

The occurrence and distribution of these species will require specific consideration in the planning of the proposed project as discussed in Chapter 4.

3.9 RECREATION

The LMPA and surrounding areas provide opportunities for dispersed recreation activities such as hunting (big game and sage grouse), wildlife viewing, rock hounding and off-road vehicle (ORV) use. Nearby Fontenelle Reservoir offers a variety of recreation opportunities and receives substantial use; most recreation use in the general area is related to Fontenelle Reservoir and the Green River. Recreation use of the LMPA is believed to be minimal (Foster 2003). There are no special recreation management areas, designated recreation use areas, developed recreation facilities or scenic or historic trails within the LMPA.

3.10 VISUAL RESOURCES

The LMPA is located in within the Wyoming Basin physiographic province and lies within the Colorado-Sandy Landscape. The topography is gently rolling with infrequent and indistinct drainages that are below the normal view. These drainages are often deep with steep banks. The landscape is characterized by light-brown to brown fine-textured soils and low, grey, finely textured vegetation, primarily sagebrush with intermittent occurrences of lower growing half-shrubs (USDI - BLM 1995).

Human viewers of the LMPA are primarily oil and gas workers and, less frequently, hunters and other recreationists. Because of distance and higher elevation, the LMPA is not visible from Fontenelle Reservoir. Higher elevations within the LMPA offer dramatic views of the Wind River Mountains to the northeast and east and Commissary Ridge to the west. Existing cultural modifications within the LMPA include extensive oil and gas field development (roads, well pads, wellhead facilities and production facilities). The LMPA is situated about six miles north of the Oregon Trail and about nine miles to south of the Sublette Cutoff of the Oregon Trail, and is outside the viewshed of both trails.

According to the RMP, the region which contains the LMPA has been designated as Visual Resource Management (VRM) Class IV, which allows for major modification of the existing character of the landscape. The level of change within Class IV areas may be high and management activities may dominate the view and be the major focus of attention. As with all VRM classes, surface disturbing activities must include appropriate mitigation measures to reduce visual impacts. Mitigation is achieved by designing and locating disturbances to most closely meet the minimum degree of contrast acceptable for the VRM class.

3.11 CULTURAL AND HISTORIC RESOURCES

Management Objectives

The objectives for the management of the cultural and paleontological resources are to:

- Expand the opportunities for scientific study, and educational and interpretive uses of cultural and paleontological resources;
- Protect and preserve important cultural and paleontological resources and/or their historic record for future generations; and
- Resolve conflicts between cultural/paleontological resources and other resource uses.

Of particular concern are significant sites of historic or prehistoric human habitation, sites demonstrating unique ethnic affiliation, places having traditional cultural significance to Native Americans, and vertebrate fossil localities (USDI-BLM 1997).

3.11.1 Cultural Chronology of Area

Archaeological investigations in the Green River Basin indicate the area has been inhabited by prehistoric people for at least 10,000 years from Paleoindian occupation to the present. The accepted cultural chronology is based on a model for the Wyoming Basin by Metcalf (1987) and revised by Thompson and Pastor (1995). The Wyoming Basin prehistoric chronology is documented in Table 3-12. Not all sites discussed below are located in the project area.

Paleoindian Period

The oldest period for which there is solid archaeological evidence is the Paleoindian, beginning ca. twelve thousand years before present (YBP) and ending around 8500 YBP. This is the transition period from the periglacial conditions of the Wisconsin ice advance during the terminal Pleistocene to the warmer and drier climatic conditions of the Holocene. A savanna-like environment with higher precipitation than occurs today was prevalent in southwest Wyoming. Archaeological research has focused on understanding paleoenvironmental conditions operating at the end of the Pleistocene and into the Holocene to provide insights into the articulation between human populations and the environment (Thompson and Pastor 1995). Paleoindian sites are rare in southwest Wyoming. The Blue Point Site (48SW5734), located

Table 3-12. Prehistoric chronology of the Wyoming Basin.

Period	Phase	Age (YBP)
Paleoindian		12,000 - 8500
Early Archaic	Great Divide	8500 - 6500
	Opal	6500 - 4300
Late Archaic	Pine Spring	4300 - 2800
	Deadman Wash	2800-2000/1800
Late Prehistoric	Uinta	2000/1800 - 650
	Firehole	650 - 300/250
Protohistoric		300/250 - 150

Source: Metcalf (1987), as modified by Thompson and Pastor (1995)

south of the project area along a playa lake, contained Paleoindian projectile points and dates to 9540 YBP (Johnson, in prep.). However, isolated surface finds of Paleoindian projectile points are not uncommon and suggest that site preservation or visibility may be factors affecting the number of known sites. The Paleoindian tool assemblage includes lanceolate points, gravers, and end-scrapers.

Archaic Period

Settlement and subsistence practices, in southwest Wyoming, remained largely unchanged from the end of the Paleoindian period through the Archaic and continued until at least the introduction of the horse, or even until Historic Contact. Reduced precipitation and warmer temperatures were in place by ca. 8500 YBP. The environmental change at the end of the Paleoindian period led to a pattern of broad spectrum resource exploitation which is reflected in the more diverse subsistence and settlement practices of the Archaic period.

The Archaic period is divided into the Early and the Late periods and subdivided in the Great Divide and Opal and the Pine Spring and Deadman Wash phases, respectively. Large side- and corner-notched dart points used for hunting are temporally diagnostic artifacts of the Archaic period. The earliest dated occurrence of side-notched points are Component I at the Maxon Ranch site dating between 6400 - 6000 YBP (Harrell and McKern 1986). Large side-notched points from the Great Basin and Colorado Plateau occur as early as 7000 years YBP. The presence of ground stone implements suggests a greater use of plant resources during the Archaic period. Faunal assemblages from Archaic period components document increased use of small animals (Thompson and Pastor 1995). Slab-lined features and housepits are also prevalent during this period.

Several sites located near the project area contain Archaic components. The Vegan site (McKern and Creasman 1991) dates to 7570 and 8400 YBP and contains lithic material, ground stone, and bone scrap. The Taliaferro site (Smith and Creasman 1988) also had Archaic components that produced large and small mammal bone, floral remains, structures, and large side-notched points.

Late Prehistoric Period

The Late Prehistoric period is between 2000 - 250 YBP and is subdivided into the Uinta and the Firehole phases. Large-scale seed processing and an increase in the number of features is noted in the Late Prehistoric period as is the presence of pottery and the introduction of the bow and arrow technology. A characteristic of the Uinta phase is clusters of semi-subterranean structures dating to ca. 1500 YBP. The Pescadero site is located north of the Hams Fork River, south of the study area. The Pescadaro site (48LN2068) exhibited many Uinta phase characteristics such as lignite stone beads, ground stone tools, bone awls, bone pendents and bead fragments, notched pebbles, Rose Spring points, chipped stone tools, flakes, and faunal remains (McKibbin 1995). The Firehole phase is distinguished from the preceding Uinta phase by a dramatic decline in radiocarbon dates possibly related to a decline in population density. The Cow Hollow Creek (Schock et al. 1982) and Skull Point (McGuire 1977) sites are located in southwest Wyoming and date to the Firehole phase.

Protohistoric Period

The Protohistoric period begins sometime after 300 years YBP with the first European trade goods to reach the area, and ends with the development of the Rocky Mountain fur trade 150 years ago. The Wyoming Basin was the heart of Shoshone territory during this period, with occasional forays into the area by other groups such as the Crow and Ute (Smith 1974). The most profound influence on native cultures during this time was the introduction of the horse enabling Native Americans to expand their range. All forms of rock art denoting horses, metal implements, and other Euro-American goods are associated with the Protohistoric period. Metal projectile points have been recovered from both surface and subsurface contexts in southwest Wyoming. Site 48LN434, located east of the project area, contained a protohistoric metal projectile point (Schoen 1986).

Historic Period

Historic use of the project area is limited to westward expansion, ranching/grazing activities, and fur trapping and trading activities associated with the Green River. No corrals, ranches, or local roads are shown on the 1882 GLO maps and no historic sites have been recorded in the project area. Several water wells are noted on various maps of the general area but none in the project area. Fur trapping and trading occurred at the confluence of the Hams Fork and the Blacks Fork rivers, ca. 40 miles to the south and on the Green River to the west of the project area as early as 1834. Names Hill, a stone face bearing the alleged name of mountain man/fur trader Jim Bridger, is located along the Green River ca. 7 miles west of the project area. Table 3-13 summarizes the historic chronology of the area.

The Sublette Cutoff (48LN225/48SW1841), a variant of the Oregon Trail is located a little over one mile to the north and 2.5 miles to the west of the project area. "In November 1978, with the passage of an amendment (Public Law 95-625) to the National Trail System Act (Public Law 90-543), the Oregon and Mormon Pioneer Trails were designated as National Historic Trails by Congress" (USDI-BLM 1986). This act protects the trail remnants, variants, and artifacts. However, the entire six sections in question are covered under the Blue Forest Memorandum of Agreement (MOA). This MOA between the BLM and the SHPO establishes an area within which the setting of the Sublette and Kinney cutoffs is determined as being non-contributing due to extensive existing gas development (Del Bene email communication 2003).

3.11.2 Summary of Known Cultural Resources

The Cultural Records Office in Laramie provided information on the previous work conducted in the Little Monument Project Area and previously recorded sites located in the project area. Records at Western Archaeological Services (WAS) were consulted for previous work in the project area. Consultation with the Archaeology Specialist of the RSFO of the BLM was conducted. There have been 18 projects conducted in the project area resulting in the recordation of 7 sites. These projects include 16 Class III block and linear surveys (including 1 seismograph survey) and 1 pipeline monitor. Limited amounts of field work have resulted in the documentation of cultural resources through survey, testing, examination of ethnographic records, and historic record research. No excavations have been conducted in the LMPA and no radiocarbon analysis has been conducted on cultural resources in the project area.

Table 3-13. Historic chronology.

Phase	Age A.D.
Protohistoric	1720 - 1800
Early Historic	1800 - 1842
Pre-Territorial	1842 - 1868
Territorial	1868 - 1890
Expansion	1890 - 1920
Depression	1920 - 1939
Modern	1939 - Present

Massey (1989)

The project area encompasses approximately six square miles or 3,857 acres. The entire project area falls under both surface and mineral jurisdiction of the federal government.

Approximately 240 acres (block) or ca. 6.8% of the project area have been inventoried for cultural resources. There are no acreage calculations for the linear projects.

The overall site density within the project area cannot be accurately calculated due to the paucity of projects conducted within the project area. Four sites have been recorded in Section 28 (48SW5135, 48SW5136, 48SW10919, and 48SW12064), one site (48SW6924) has been recorded in Section 21, and one site (48SW5134) has been recorded in Section 27. The Yellow Point Landscape (48SW10923) has been identified in all sections within the project area.

Site types
Seven sites have been recorded in the project area including six prehistoric open camp sites and one lithic landscape. No historic sites have been recorded in the project area. None of the sites in the project area are eligible to the NRHP.

Prehistoric sites
Prehistoric camps consist of sites that contain evidence of a broad range of activities including

subsistence-related activities. They may contain formal features, lithic debris, chipped stone tools, evidence of milling/vegetable processing activities including ground stone, and pottery. Single as well as multiple occupations are represented. Six of the seven previously recorded sites have been classified as open camps.

Lithic debris scatters consist of sites containing lithic debitage or stone tools. The sites are described as representing short-term activities. No lithic scatters have been identified in the project area.

Quarries are sites where lithic raw material was obtained and initially processed. Primary and secondary lithic procurement areas are geologic locations where chert and quartzite cobbles have been redeposited. No quarries have been identified in the project area.

Lithic landscapes are secondary lithic procurement deposits recommended not eligible for inclusion on the National Register. The artifacts from the sites cannot be associated with a specific cultural group or tradition nor can they be temporally associated. The Yellow Point Lithic Landscape (48SW10923) has been identified in the project area.

Human burials, rock alignments, and rock art have been identified as sensitive or sacred to Native Americans. Although human burials, rock alignments, or rock art have not been documented in the project area, it is important to be cognizant of the possibility of such resources.

Pottery/ceramics are relatively rare and no sites containing pottery have been identified in the project area. Pottery is usually associated with the Uinta phase of the Late Prehistoric period. Many times only a few fragmentary shards are found on a site's surface.

Consultation with appropriate Native American tribes pertaining to areas of concern for traditional, cultural, and religious purposes will occur in accordance with the American Indian Religious Freedom Act and BLM Manual 8160-1 Handbook. Native American consultation will occur within the context of specific development proposals, but will also be an ongoing process between BLM and affected Indian tribes and traditional cultural leaders (USDI-BLM 1997).

Historic sites

The Sublette Cutoff (48LN225) variant of the Oregon Trail is located slightly over one mile north and 2.5 miles west of the project area. The entire six sections in question are covered under the Blue Forest MOA. This MOA between the BLM and the SHPO establishes an area within which the setting of the Sublette and Kinney cutoffs is determined as being non-contributing due to extensive existing gas development.

No historic sites have been noted in the project area and no corrals, ranches, or local roads are shown on the 1892 GLO maps. Several water wells are noted on various maps of the general area but none in the project area.

Summary

Prehistoric subsistence and settlement patterns reflect a hunter-gatherer lifeway. Research into the subsistence and settlement patterns used during the Archaic period indicates summer occupations in the mountains, winter occupations in the foothills, and spring and fall movements utilizing all available zones (Creasman and Thompson 1997). Subsistence patterns in the Archaic period and the Late Prehistoric period are similar in that they are based on seasonal

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movement throughout the basins and foothills in response to the availability of floral and faunal resources (Creasman and Thompson 1988). A wide diet breadth is evident in extensive procurement and processing of small mammals. By 450 YBP (Shimkin 1986), or possibly earlier (Bettinger and Baumhoff 1982), Numic-speaking Shoshonean groups occupied the Wyoming Basin and continued to reside there until Euro-American expansion relegated them to reservations beginning in 1868.

Few prehistoric sites have been recorded in the project area mainly due to the paucity of projects conducted in the area. Due to the proximity of the Green River to the project area, it is likely that more prehistoric sites will be located as development increases. In the Green River Basin, certain topographic settings, such as eolian deposits (sand dunes, sand shadows, and sand sheets), alluvial deposits along major drainages, and colluvial deposits along lower slopes of ridges, have higher archaeological sensitivity and should be attentively addressed.

The Sublette Cutoff of the Oregon Trail is north of the LMPA, but as noted above, it is non-contributing. No other historic sites have been noted in the project area and no corrals, ranches, or local roads are shown on the 1892 GLO maps. Several water wells are noted on various maps of the general area but none in the project area.

3.12 SOCIOECONOMICS

3.12.1 Introduction

Area socioeconomic conditions potentially affected by the Proposed Action and No Action Alternative include the local economy (primarily employment and earnings in the oil and gas industry and other sectors of the economy), population, housing, emergency response services, and local, state and federal tax revenues.

The LMPA is located entirely within Sweetwater County and is situated in an area of southwest Wyoming that also includes northeastern Lincoln County and southwestern Sublette County, an area of substantial existing oil and gas development. Rock Springs has emerged as a regional oil and gas service center and numerous other oil and gas service firms and suppliers are located in the Sweetwater County communities of Green River and the Farson/Eden area, the Lincoln County communities of Kemmerer, Diamondville and La Barge, and the Sublette County communities of Big Piney and Marbleton.

These communities would provide labor, services and supplies for the Little Monument project, and would also house and provide services to temporary workers coming into the area to work on the project. Therefore, the primary area of analysis for potential socioeconomic impacts is Sweetwater County, although oil and gas activity, temporary housing and emergency response capabilities will be discussed for Lincoln and Sublette counties and nearby communities.

3.12.2 Economic Conditions

An area's economic base is comprised of activities which bring money into the local economy from other areas of the state, nation and world. Sweetwater, Lincoln and Sublette counties all have natural resource-based economies. Basic sectors common to all counties include oil and gas production and processing, agriculture, tourism and recreation and state and federal government. The Sweetwater and Lincoln county economies are also based on coal mining, electric power generation and transportation (primarily the Union Pacific railroad). Trona mining, the manufacturing of soda ash and related products and fertilizer manufacturing also add to the Sweetwater County economic base.

Employment and earnings are addressed for Sweetwater County because that is where the direct employment associated with the Little Monument project would occur. However, employees would be drawn temporarily from nearby communities and from outside the region and secondary employment effects would occur throughout southwest Wyoming.

3.12.2.2 Employment, Unemployment and Labor Force

Sweetwater County total full and part-time employment grew from the 1990 level of 22,856 jobs to a 2000 level of 24,436, growing by about seven percent or 1,580 jobs. There was some volatility during the period, however. In 1994 total employment peaked at 25,177 jobs. (WDAI 2002a). These employment statistics, compiled by the US Bureau of Economic Analysis, represent full and part-time jobs located within the county.

3.12.2.3 Earnings

Sweetwater County earnings by place of work increased from $633 million in 1990 to $881 million in 2002, a 39 percent increase over the decade (WDAI 2002b). This increase compares to a 56 percent increase in earnings for the State of Wyoming during this period. However, when adjusted for inflation, Sweetwater County earnings increased by about 6 percent during this period.

3.12.2.4 Recent Oil and Gas Activity

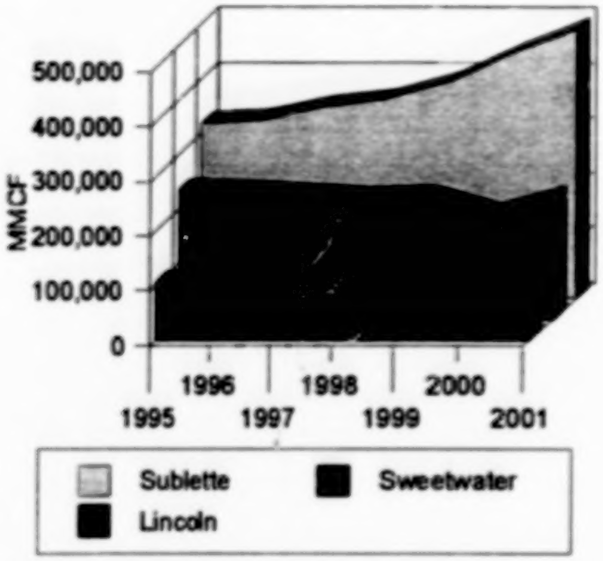
Production and approved APD's are two measures of oil and gas activity. As shown in Figure 3-8, annual natural gas production in Sweetwater and Lincoln counties has decreased over the six-year period, although Sweetwater County production has recently begun to increase. Production in Sublette County has been increasing fairly constantly throughout the period.

Together, these three counties accounted for just over half of Wyoming's total natural gas production in 2001 (WOGCC 1995-2001).

Approved APD's reflect both current and potential future oil and gas activity. Increased drilling may result in increased production if drilling efforts are successful and commodity prices increase or stabilize at economic levels. In the three counties, approved APD's have increased substantially in recent years (see Figure 3-9). In 2001, a total of 1,056 APD's were approved for the three-county area, including 534 in Sweetwater County, 435 in Sublette County and 87 in Lincoln County. APD's in Sweetwater and Lincoln counties decreased slightly duiring 2002 while APD's in Sublette County increased slightly. Note that 2002 statistics reflect applications rather than approved applications as in other years.

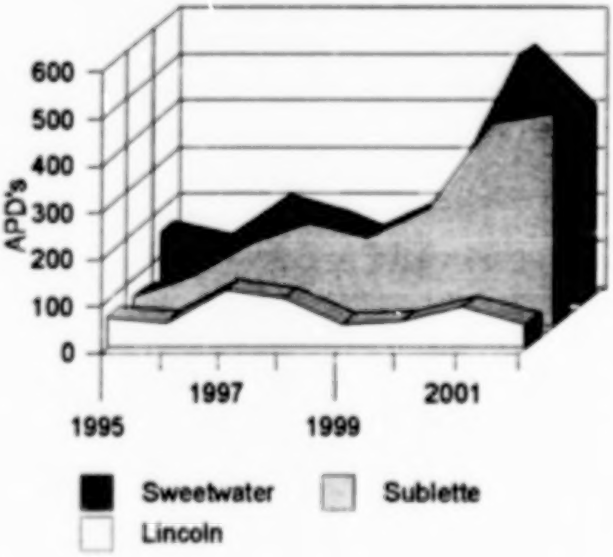
In 1995, there were a total of 3,640 producing wells (oil and gas) in the three-county area. By 2001, that number had increased to 5,414, a 49 percent increase over the 6 year period. The relatively high levels of natural gas exploration, drilling and production which have occurred in southwest Wyoming in recent years has sustained an active natural gas service industry (Robbins 2003). Additionally, natural gas development in the region is served by contractors operating out of Casper, Rawlins, Evanston and Riverton.

Figure 3-8. Natural Gas Production for Sweetwater, Lincoln and Sublette Counties: 1995-2001.



Source: WOGCC 1995-2001

Figure 3-9. Approved Sweetwater County APD's: 1995-2001.



Source: WOGCC 1995-2001

3.12.2.5 Other Economic Activities in the Vicinity of the Project Area

In addition to oil and gas exploration and production, other economic activities occurring in and near the LMPA include grazing (Section 3.6) and low-intensity dispersed recreation (Section 3.9), (Deakins 2003).

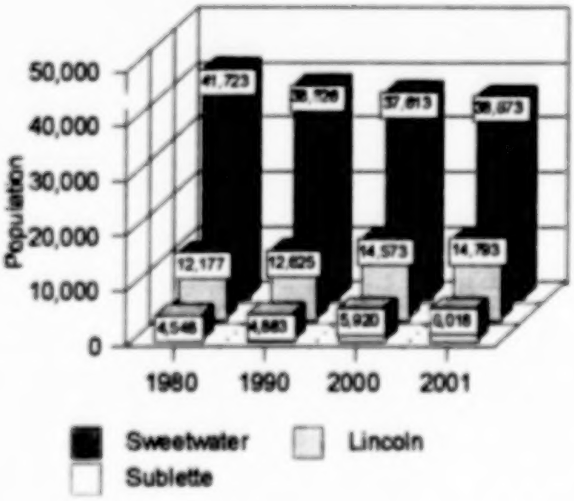
3.12.3 Population Conditions

Population levels in Sweetwater County have been volatile over the past 20 years. Sweetwater County population in 2000 was almost 10 percent lower than its 1980 level of 41,723 (Figure 3-10). It is estimated that Sweetwater County population continued to fail in 2001, losing an additional 2 percent of population (WDAI 2002c).

Although Lincoln and Sublette counties have grown in recent years, virtually every community near the LMPA lost population between 1990 and 2000, with the exception of Marbleton (Table 3-14). Nearby Lincoln and Sublette County communities have begun to add population in recent years (WDAI 2002d)

The most recent population forecasts available from the Wyoming Division of Economic analysis projects that population levels in Sweetwater County will decrease 6 percent by 2010, to 35,399. Lincoln and Sublette county communities near the LMPA are projected to lose population after slight increases in 2001, except Marbleton, which is projected to grow modestly throughout the decade (WDAI 2002d).

Figure 3-10. Sweetwater County Population: 1980, 1990, 2000 and 2001.



Source: WDAI 2002c

3.12.4 Housing

The nature of natural gas drilling and field development activities (relatively short duration tasks performed primarily by contractors) results in demand for temporary housing resources such as motel rooms and mobile home and recreational vehicle (RV) spaces near the project area.

There are a substantial number of temporary housing resources (motels and RV parks) available in Rock Springs including 15 motels with over 1,100 rooms and 30 mobile home parks with over 1,900 pads (PIC 1997).

Temporary housing resources in the Kemmerer/Diamondville area are in good supply. Recent workforce reductions have caused a number of rental units to be placed on the market.

Table 3-14. Population 1990 - 2001: Counties and Communities Near the LMPA.

	1990	1995	2000	2001
Sweetwater	38,823	40,635	37,613	36,873
Rock Springs	19,050	19,687	18,708	18,340
Green River	12,711	12,778	11,808	11,576
Lincoln County	12,625	14,073	14,573	14,793
Kemmerer	3,020	2,963	2,651	2,691
Diamondville	864	827	716	727
La Barge	493	483	431	438
Sublette County	4,843	5,515	5,920	6,018
Big Piney	454	449	408	415
Marbleton	634	696	720	732

Source WDAI 2002d

Additionally, there are six motels with a total of over 200 rooms in the area, and two recreational vehicle (RV) parks with a total of almost 100 units (Picerno 2001).

Temporary housing resources in the Big Piney/Marbleton area include two motels with a total of 45 rooms in Marbleton and two motels with a total of 36 rooms in Big Piney. Additionally there are mobile home parks and campgrounds with RV spaces in both towns.

3.12.5 Community Facilities, Law Enforcement and Emergency Management Services

Law enforcement in the area surrounding the LMPA is provided by the Sweetwater County Sheriff's Department. No routine patrols are provided in the area, rather deputies respond on an as needed basis (Scofield 2003).

Emergency management in Sweetwater County is coordinated by the Sweetwater County Emergency Management Agency (SCEMA), which operates under Federal Emergency Management Agency (FEMA) and Environmental Protection Agency (EPA) guidelines. SCEMA is the agency designated by the Sweetwater County Commissioners to analyze potential hazards, assess emergency response capabilities, plan for and respond to potential events and mitigate the effects of emergencies or disasters. SCEMA coordinates with response agencies, industry, elected officials and volunteer agencies to accomplish its mission of limiting injuries, loss of life and damage to property.

The portion of Sweetwater County that includes the LMPA is served by emergency response organizations (fire suppression, emergency medical and ambulance) located in the Eden/Farson area and the Town of Granger, with support from agencies in Green River and Rock Springs. Sweetwater County also has mutual aide agreements with emergency response agencies in Lincoln and Sublette counties, and emergency response agencies in Kemmerer and the Big Piney Marbleton area are likely to respond to accidents and emergencies if they are the closest agencies. Routine injuries may be treated at the medical center in Kemmerer, the Marbleton/Big Piney Medical Clinic, or at Memorial Hospital in Rock Springs. Cases requiring specialized treatment are transported to Salt Lake City by air ambulance services dispatched from Salt Lake City (Valentine 2003).

3.12.6 Local, State and Federal Government Fiscal Conditions

Fiscal conditions most likely to be affected by the Proposed Action and alternatives include the following:

- Sweetwater County, school and special district ad valorem property tax revenues;
- State, county and municipal sales and use tax revenues;
- State severance tax revenues; and
- Federal mineral royalties.

3.12.6.1 Ad Valorem Property Tax Revenues

Oil and gas companies pay ad valorem property taxes on production and facilities, with certain exemptions.

In Sweetwater County, fiscal year (FY) 2002 assessed valuation was over $1.4 billion, 0.2 percent less than the previous year. 2002 property tax revenues were $93.2 million, about 0.7 percent lower than 2001. Natural gas is assessed on the previous year's production. FY 2002 assessed valuation from 2001 natural gas production totaled $577.6 million or about 41 percent of total assessed valuation (WTPA 2002). FY 2002 mill levies within the unincorporated portion of Sweetwater County which contains the LMPA total 62.558 mills, including 43.5 mills for schools, a 12 mill county levy, 0.266 for weed and pest control, a 5 mill community college levy, 0.571 mills for fire protection, 0.931 mills for solid waste and 0.29 mills for the Eden/Farson cemetery.

3.12.6.2 Sales and Use Tax

Wyoming has a statewide four percent sales and use tax. Sweetwater County collects an additional one percent general-purpose local-option sales and use tax and a 0.5 percent specific purpose local-option tax, dedicated to construction of a new county jail. FY 2002 sales and use tax collections in Sweetwater County totaled about $59.56 million.

About 28 percent (less administrative costs) of the statewide four percent sales and use tax collections and all of the general purpose local option collections (also less administrative costs) are distributed to the county and its incorporated municipalities according to a population-based formula.

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3.12.6.3 Wyoming Severance Taxes

The State of Wyoming collects a six percent severance tax on oil and natural gas. Severance tax revenues are distributed to the Wyoming Mineral Trust Fund, General Fund, Water Development Fund, Highway Fund, Budget Reserve Account, and to counties and incorporated cities and towns. In FY 2002, severance tax distributions totaled $299 million (CREG 2003a). Of the total, about 43 percent was attributable to severance taxes on natural gas.

3.12.6.4 Federal Mineral Royalties

The federal government collects a 12.5 percent royalty on oil and natural gas extracted from federal lands. Fifty percent of those royalties are returned to the state where the production occurred. In Wyoming, the state's share is distributed to a variety of accounts, including the University, the School Foundation fund, the Highway fund, the Legislative Royalty Impact Account, and cities, towns and counties. In FY 2002, a total of $348.6 million in federal mineral royalty funds were distributed to Wyoming entities (CREG 2003b).

3.13 TRANSPORTATION

The regional transportation system serving the LMPA includes an established system of interstate and state highways and county roads. Local traffic on federal land is also served by BLM roads and operator-maintained oil and gas field roads (Figure 3-11).

3.13.1 Highway Access to the Project Area

Highway access to the project area from Rock Springs and Green River is provided by Wyoming State Highway 372 (WYO 372), a two-lane, paved secondary highway which travels 38 miles northwest from I-80 to Fontenelle and another 11 miles west to its intersection with US 189 about 24 miles northeast of Kemmerer. Refer to Figure 3-11 for a road map of the area.

Access to the Project area from Kemmerer/Diamondville is provided by US 189 and WYO 372. Access from Big Piney/Marbleton is also provided by US 189, a paved, two-lane, primary highway, connecting US Interstate 80 on the south with Hoback Junction to the north, passing through Diamondville, Kemmerer, La Barge, Big Piney, Marbleton and Daniel.

Recent traffic volumes on Wyoming federal and state highways are listed in Table 3-15. The Wyoming Department of Transportation (WYDOT) assigns levels of service to highways in the state system. Levels of service (A through F) are assigned based on qualitative measures (speed, travel time, freedom to maneuver, traffic interruptions, comfort and convenience) that characterize operational conditions within traffic streams and the perceptions of those conditions by motorists. A represents the best travel conditions and F represents the worst. The federal and state highways proving access to the LMPA are currently rated A and A/B (Jones 2003).

3.13.2 County and BLM Road Access to the Project Area

From WYO 372, access to the LMPA is provided by a short (less than one mile) stretch of Lincoln County Road (LCR) 311, a two-lane gravel road, which is treated with dust suppressant (Dana 2003). Immediately after the Lincoln/Sweetwater County line is a bridge over the Green River on Sweetwater County Road (SCR) 8. The bridge is adequate for most loads, however, oversize wide loads have damaged the guard rails in the past. On the east side of the bridge, SCR 8 connects with SCR 52, which travels about three miles north to connect with BLM Road 4202. BLM Road 4202 travels another six miles north to the southern boundary of the LMPA, traverses the project area along the western boundary for two miles and exits to the north. Some traffic coming from the Farson/Eden area uses SCR 49, which intersects with US 191 two miles north of Farson and proceeds west 32 miles to its intersection with SCR 52. Sweetwater County has a motor grader stationed in this area of the county to perform ongoing road maintenance activities (Gibbons 2003).

Traffic coming from La Barge and the Big Piney/Marbleton area sometimes uses LCR 318, which intersects with US 189 about five miles south of La Barge, and travels about a mile east and becomes BLM Road 4210 which intersects with BLM Road 4202 about 6 miles north of the LMPA. LCR 318 also has a one-lane bridge over the Green River, which has had its guard rails damaged by over-sized wide loads. A more common route for traffic coming from the north involves Lincoln County Road 313, which leaves US 189 and heads about 4 miles east toward Fontenelle Dam (the road across the dam is currently closed) and then heads south on LCR 316 for about three miles, and connects with LCR 311 at Fontenelle. This road receives intensive use and requires frequent maintenance including dust suppression. It is a priority of the Lincoln County Road and Bridge Department to pave this road when funds become available (Dana 2003).

3.13.3 Access within the Project Area

Existing access within the proposed LMPA is provided by BLM Road 4202 and an existing road network developed to service prior and ongoing drilling and production and ongoing livestock grazing activities. BLM Road 4202 and the gas field roads have been developed to accommodate gas field traffic and are maintained by the operator under the ROW grant.

Table 3-15. Traffic and Level of Service on Highways Providing Access to the Project Area.

Route	2001 AADT	2000 AADT	Level of Service
WYO 372 @ Milepost 38.409 (Sweetwater/Lincoln County Line)	270 (40) Trucks	300 (60) trucks	A
US 189 @ Milepost 61.240 (Fontenelle Townsite Road)	810 (90 trucks)	690 (90 trucks)	A/B
US 189 @ Milepost 83.960	940 (120 trucks)	890 (120 trucks)	A/B

Source: WYDOT 2001, Jones 2003

3.14 HEALTH AND SAFETY

Existing health and safety concerns in and adjacent to the LMPA include hazards associated with existing oil and gas operations ad exploration. Occupational hazards associated with oil and gas operations generally affect workers in the field and at oil and gas facilities. Two types of workers are employed in oil and gas fields: oil and gas workers, who had a 1998 non-fatal accident rate of 4.0 per 100 workers, and special trade contractors, who had a non-fatal accident rate of 8.9 per 100 workers (U.S. Department of Labor, Bureau of Labor Statistics 2000). These rates compare with an overall private industry average for all occupations of 6.2 per 100 workers.

There are also, existing risks associated with natural gas pipelines, although these risks are statistically very small. Nationwide, injuries associated with gas transmission pipelines averaged 14 per year from 1990 through 1996, fatalities averaged one per year and incidents such as ruptures averaged 79 per year (U.S. Department of Transportation 1998). Finally, there also within the LMPA are risks associated with vehicular travel on improved and unimproved county, BLM and oil and gas field roads; with firearms accidents during hunting season and by casual firearms use such as plinking and target shooting; and with natural events such as flash floods, landslides, earthquakes, and range fires, which can also result from human activities.

3.15 NOISE

Other than back ground noise (primarily wind), on-going natural gas production and maintenance operations and related traffic create most sound disturbances within and in the immediate vicinity of the LMPA. Aircraft overflights (generally at high altitudes) and localized vehicular traffic also create short-term, localized sound disturbances.

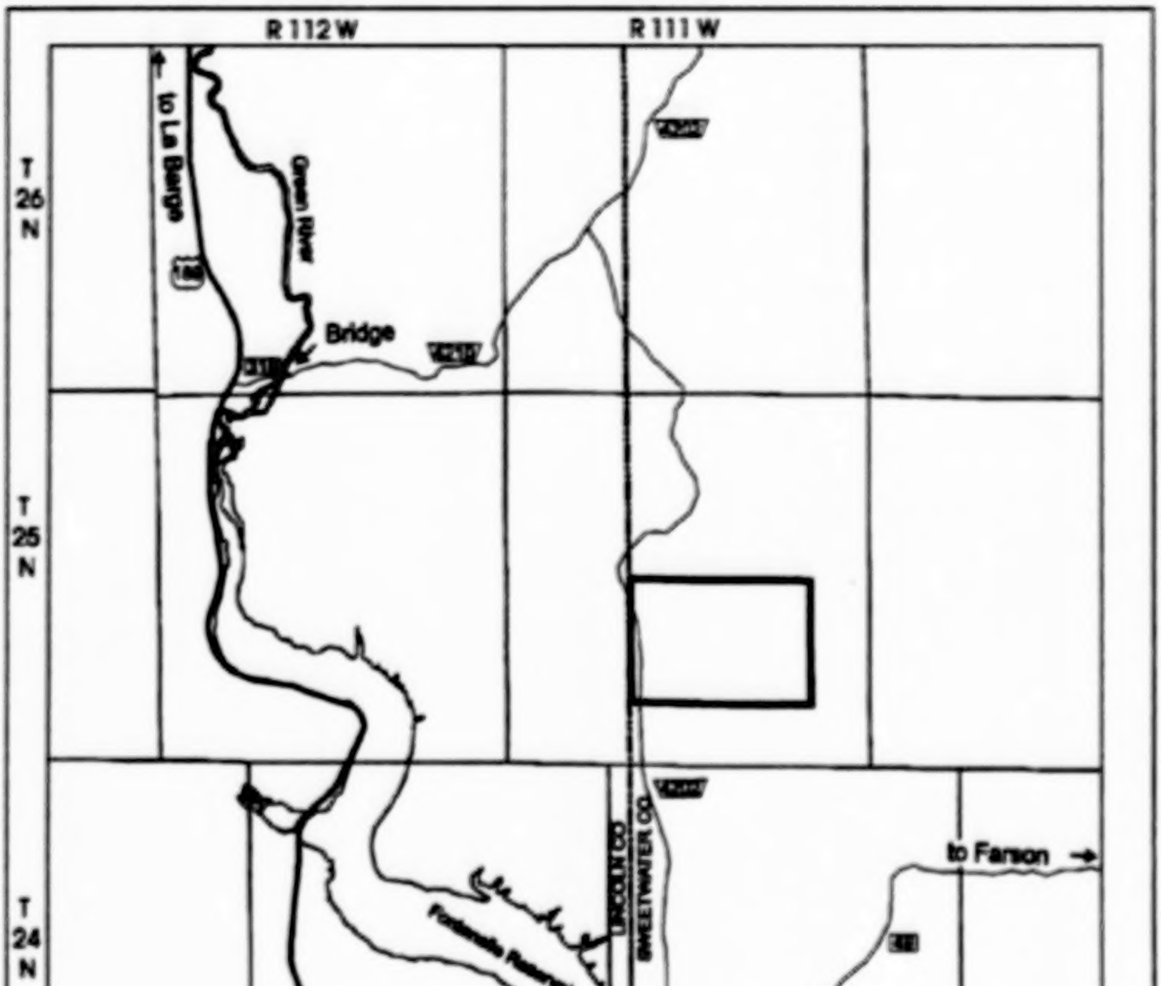

Figure 3-11. Highway and Road Access to the LMPA.

CHAPTER 4

ANALYSIS OF ENVIRONMENTAL CONSEQUENCES

CHAPTER 4

ANALYSIS OF ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

This chapter of the environmental assessment (EA) provides an analysis of the potential environmental consequences that would result from implementation of the proposed Little Monument natural gas project and/or alternatives. Certain measures that would avoid or reduce impacts under the Proposed Action have been included in Chapter 2. The following impact assessment takes these measures into consideration. Additional opportunities to mitigate impacts beyond the measures proposed in Chapter 2 are presented in this chapter for each resource discipline.

An environmental impact or consequence is defined as a modification or change in the existing environment brought about by the Proposed Action or alternatives to the Proposed Action. Impacts can be direct or indirect in nature, and can be permanent (long-term) or temporary (short-term). Impacts can vary in degree ranging from only a slight discernable change to a drastic change in the environment. Short-term impacts are impacts that occur during and immediately after pipeline construction and testing and last from two to five years. For purposes of this EA, short-term impacts are defined as lasting five years or less. Long-term impacts are impacts imposed by construction and operations that remain longer than five years and extend for the life-of-project (LOP) and beyond.

Discussions of the potential environmental consequences for each resource section include the following.

Impacts The level and duration of impacts that would occur as a result of the Proposed Action or the No Action Alternative. The impact evaluation assumes that the applicant-committed practices described in Chapter 2 would be implemented. Direct impacts are those which are caused by the action and occur at the same time and place. Indirect impacts are those impacts which are caused by the action but occur later in time or farther removed in distance.

Mitigation Any measures, in addition to those described in Chapter 2 that could be applied to avoid or further reduce adverse impacts.

Residual Impacts A summary of impacts that are unavoidable and cannot be reduced or eliminated through the application of available and reasonable mitigation and, therefore, would remain throughout the duration of the project and to some point beyond.

Cumulative Impacts A description of impacts likely to occur due to this project in combination with other on-going and recently approved activities, recently constructed projects and other past projects, and projects likely to be implemented in the near future (reasonably foreseeable future actions or RFFA's). Because the project area falls within the Lincoln Road Project area that was analyzed in the Fontenelle EIS and is well within the level of development approved in the associated ROD, the CIA for most land-based resources is limited to either the sections involved in the proposal or the Lincoln Road Project area. The CIA for air quality, livestock grazing, and socioeconomics consider larger areas.

CHAPTER 4: ANALYSIS OF ENVIRONMENTAL CONSEQUENCES

4.1 GEOLOGY/MINERALS/PALEONTOLOGY/SOILS

4.1.1 Geology

4.1.1.1 Impacts

4.1.1.1.1 Proposed Action

Impacts could occur to the geologic environment as a result of the Proposed Action if alteration of existing land surface steepens slopes or otherwise increases runoff or causes undercutting that could initiate slumping, landslides or other mass movements. If existing BLM construction restrictions on slopes and construction design described in Chapter 2 followed the possibility of the project initiating landslides or other mass movements, flooding is considered unlikely.

Impacts could occur to the geologic environment as well as project facilities as a result of inherent geologic hazards (e.g., landslides, mass movements, earthquakes), but this is considered unlikely. The relatively low relief over most of the area and the nearly horizontal geologic dip on the rocks at the surface lessens the chance for naturally occurring mass movements. In addition, no large landslides or mass movement deposits occur within the project area and no earthquake epicenters have been documented within 15 miles of the project area.

4.1.1.1.2 Alternative A – No Action

Under the No Action Alternative the lands surface would not be modified by the Proposed Action, and only affected by natural erosional processes and development as a result of APD's on federal lands considered on a case-by-case basis through individual project and site-specific environmental analysis.

4.1.1.2 Mitigation

No additional mitigation to the geologic environment is proposed.

4.1.1.3 Cumulative Impacts

No cumulative impacts to the geologic environment are identified.

4.1.1.4 Residual Impacts

No residual impacts to the geologic environment are identified.

4.1.2 Minerals

4.1.2.1 Impacts

4.1.2.1.1 Proposed Action

Natural gas is the only mineral resources that would be impacted with implementation of the Proposed Action. Production of natural gas would deplete reserves, but the proposed project allows for recovery of Federal natural gas resources per 43CFR 3162(a) and generation of private and public revenues.

4.1.2.1.2 Alternative A – No Action

Under the No Action Alternative natural gas reserves would not be developed and produced as discussed for the Proposed Action resulting in possible waste of federal mineral resource. Private and public revenue would not be generated, except to the extent allowed for on a case-by-case basis through individual project and site-specific environmental analysis.

4.1.2.2 Mitigation

No mitigation to the mineral environment is identified.

4.1.2.3 Cumulative Impacts

Depletion of natural gas reserves as a result of production is the natural consequence of the Proposed Action in combination with other on-going natural gas programs and recently approved activities throughout southern Wyoming.

4.1.2.4 Residual Impacts

Depletion of natural gas reserves is an unavoidable impact associated with implementation of the Proposed Action. Drilling of wells however, may result in the identification of additional as yet unknown gas reserves, and allow the orderly development of gas reserves in the Little Monument Project Area.

4.1.3 Paleontology

4.1.3.1 Impacts

4.1.3.1.1 Proposed Action

Impacts could occur to the paleontology environment if surface disturbance associated with the Proposed Action results in the exposure and destruction of fossil resources, along with associated loss of geologic information. However, the Proposed Action could also result in new and important fossil resources being discovered and properly recovered and cataloged into the collection of a museum repository, so that they are available for study.

Early Tertiary (Eocene) aged sedimentary deposits represented by the Green River Formation (Laney Member) underlies the entirety of the project area. No fossil localities were identified by literature and records searches and by a field check of the area, however the Green River Formation, including the Laney Member is known to produce significant fossils elsewhere in Wyoming and is considered to be a Class 5 geological formation, or one that contains scientifically significant fossils and must be evaluated during environmental review.

4.1.3.1.2 Alternative A – No Action

Under the No Action Alternative, the Proposed Action would not be implemented and further drilling would be allowed on federal lands to the extent that it would be within the scope of

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individual APD's that could be approved on a case-by-case basis. In terms of magnitude, such impacts would likely be substantially less than for the Proposed Action. The potential discovery of previously unknown fossils resources, however would not occur.

4.1.3.2 Mitigation

The magnitude of impacts associated with the destruction of potential fossil resources can be reduced by the implementation of paleontologic resource mitigation measures described in Chapter 2 and below.

Should fossil resources be uncovered during surface disturbance associated with the Proposed Action, the project proponent or authorized personnel should immediately notify the BLM and work should cease immediately in the area of the discovery until the fossil remains can be evaluated for scientific significance by a qualified paleontologist. If fossil remains of significance are identified, additional mitigation may be proposed. Additional mitigation could include collection, identification, and curation of the fossil remains and potentially monitoring of on-going surface disturbance in the area of discovery.

4.1.3.3 Cumulative Impacts

No cumulative impacts to fossil resources are identified.

4.1.3.4 Residual Impact

No residual impacts to fossil resources are identified.

4.2 CLIMATE AND AIR QUALITY

Air pollutant emissions would occur from the Proposed Action during well site construction activities and well production, and these emissions would impact air quality in the project area. The primary pollutants emitted would be particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide (SO_2), and hazardous air pollutants (HAP's). Construction emissions would be short-term and localized in nature. Air emissions would also result during gas production from small combustion equipment at each well site.

4.2.1 Impacts

4.2.1.1 Proposed Action

Air pollutant emissions from the construction phase of the Proposed Action would result from construction of well pads and access roads, travel on unpaved roads to and from the pad sites, wind erosion of disturbed areas, diesel engine combustion from heavy construction equipment, well drilling, well completion, and pipeline construction. Construction of one well pad would be completed in 4 to 6 days. Rig-up, drilling, and rig-down at each well would be completed in approximately 16 days.

During construction, PM_{10} and $PM_{2.5}$ emissions would result from well pad, access road, and pipeline construction and travel on unpaved roads and NO_x, CO, VOC, SO_2, and HAP emissions would occur from drilling engine operation and from tailpipe emissions from heavy construction equipment. Air pollutant impacts from each well would be temporary (i.e., occurring during the 22-day well construction period or pipeline construction period) and would occur in isolation, without adversely interacting with adjacent well locations.

Pollutant emissions would also occur from the 31 wells during production operations over the 15 to 20-year LOP. Two small natural gas-fired heaters approximately 0.25 MMBTU/hr in size would operate at each well site, supporting the separator and dehydrator, which would be located at each well. Each heater would emit NO_x, CO, VOC, and HAP emissions. NO_x emissions from a typical 0.25 MMBTU/hr heater would be an estimated 0.11 tons per year (tpy) based on an AP-42 emission factor for natural gas combustion (EPA 1995). Two heaters at each of the 31 well sites would result in a total of 62 heaters and annual NO_x emissions of 6.8 tpy. This calculation assumes year-round operation; these heaters would be operated primarily during the winter months.

WDEQ-AQD air quality requirements for short-term construction are limited to the minimization of fugitive dust during construction operations. Construction emissions would not be expected to cause exceedences in ambient air quality standards due to the emissions' temporary and localized nature. Prior to commencement of operations, WDEQ-AQD requires an emission source to undergo a permit review to ensure compliance with New Source Review permit requirements. An air quality permit application or equivalent would be required to be submitted to WDEQ-AQD for review, and would require approval prior to construction or operation. No exceedences of NAAQS, WAAQS, and Class II PSD increments for any regulated air pollutant emitted would be allowed under WDEQ-AQD regulations.

Ambient pollutant data collected in the region would also serve as a demonstration of compliance with ambient standards. Regional ambient air quality background concentrations presented in Table 3-6 indicate that existing conditions in the region are below state and federal ambient standards.

4.2.1.2 Alternative A – No Action

The No Action Alternative would deny the proposal as submitted, but would allow consideration of individual APD's on federal lands on a case-by-case basis through individual project and site-specific environmental analysis. The No Action Alternative is expected to result in less impact than that described for the Proposed Action.

4.2.2 Mitigation

No additional mitigation procedures to reduce air quality impacts would be required.

4.2.3 Cumulative Impacts

The Pinedale Anticline EIS (PAC EIS) (USDI-BLM 2000), completed in May 2000, analyzed cumulative air quality impacts at Class I and Class II areas from emissions sources in southwest Wyoming. The analysis used an approach that included the modeling of existing and proposed regional sources at permitted and planned emission rates, respectively. Industrial development after 1995 was explicitly modeled in the analysis for sources in southwest Wyoming, northwest Colorado, and northeast Utah. 631 tons of PM_{10}, 2,663 tons of NO_x, 1,070 tons of SO_2, and 7,272 tons of VOC were inventoried in southwest Wyoming as part of the PAC EIS cumulative analysis. Industrial development before 1995 was accounted for in regional ambient background concentrations for each pollutant.

The PAC EIS air quality analysis predicted the impacts on ambient concentrations in PSD Class I areas and the impacts on AQRV's such as acid deposition at sensitive lakes and regional visibility at Class I areas. The study found no potential exceedences of PSD Class I Increments in federal Class I areas. Potential cumulative impacts to sensitive lakes were found to be below applicable significance thresholds. The cumulative visibility study, including the worst-case development alternative of those proposed in the PAC EIS, found a maximum of 15 days which exceeded the 0.5 deciview or 5% change in extinction visibility management threshold. Cumulative visibility impacts for all analyzed alternatives were found to be below the visibility threshold of 1.0 deciview or 10% change in extinction.

The PAC EIS cumulative analysis examined long-term emissions related to the operation of emissions sources. No construction emissions were included in the cumulative analysis. The operation phase of the Proposed Action, for which NO_x emissions are estimated at 6.8 tpy, would constitute an increase in NO_x emissions of 0.3% over levels analyzed in the PAC EIS.

4.2.4 Residual Impacts

Air emissions would be generated during construction activities occurring over the 6-day construction period. In addition, air emissions would be generated through operation of the well site heaters during production. These impacts would occur beyond the mitigation measures outlined in Chapter 2. Short-term impacts would be within state-mandated air quality levels, would be localized and temporary, and would be quickly dispersed by the wind. Long-term impacts of pollutant emissions from year-round heater operation would be within permit limits established by WDEQ-AQD and would be less than NAAQS, WAAQS, and PSD Class II Increments. Because no air emissions would occur after the LOP, no residual impacts would be expected beyond the LOP.

4.3 SOILS

4.3.1 Impacts

4.3.1.1 Proposed Action

Impacts could occur to the soil environment as a result of the Proposed Action if during surface alteration land surfaces and gradients are steepened, which could increase runoff and erosion or if soil cover is removed and the area is subject to accelerated erosion, undercutting, collapse or subsidence.

4.3.1.2 Alternative A – No Action

Under the No Action Alternative the soil surface would not be modified by the Proposed Action and only affected by natural erosional processes and development that could be authorized on a case-by-case basis. The soils in the area are well-drained and the natural slope of the lands is low, lessening the chance of flooding, erosion, or collapse or subsidence.

4.3.2 Mitigation

No mitigation to the soil environment is proposed.

4.3.3 Cumulative Impacts

No cumulative impacts to soils are identified.

4.3.4 Residual Impacts

No residual impacts to soils are identified.

4.4 WATER RESOURCES

4.4.1 Impacts

4.4.1.1 Proposed Action

Impacts described herein are based on implementation of the Proposed Action, and in terms of water resources, represent the maximum impact.

4.4.1.1.1 Surface Water

Potential impacts that could occur to the surface water system due to the Proposed Action include increased surface water runoff and off-site sedimentation due to soil disturbance (Soils Section 4.3), water quality impairment of surface waters, and stream channel morphology changes due to road and pipeline crossings. The magnitude of the impacts to surface water resources would depend on the proximity of the disturbance to a drainage channel, slope aspect and gradient, degree and area of soil disturbance, soil character, duration of construction activities, and the timely implementation and success/failure of mitigation measures. Impacts would likely be greatest shortly after the start of construction activities and would decrease in time due to stabilization, reclamation, and revegetation efforts. Construction activities would occur over a relatively short period of time; therefore, the majority of the disturbance would be intense but short-lived. Petroleum products and other chemicals could be accidentally spilled resulting in surface water contamination. Similarly, reserve and evaporative pits could leak if liners were punctured or no liners were installed, resulting in surface water degradation.

The primary impact of the Proposed Action on surface water resources is the potential for increasing surface runoff, erosion, and off-site sedimentation that could cause channel instability and degradation of surface water quality. As described in Chapter 2, total new short-term surface disturbance resulting from the Proposed Action would cover 91.4 acres (approximately 2.4 percent of the total LMPA which encompasses about 3,857 acres). The construction disturbance would not be uniformly distributed across the project area because project facilities would be located where the efficiency and feasibility of extracting the natural gas would be the highest, as discussed in Chapter 2. Locating project facilities on slopes in excess of 25 percent would constitute a adverse impact relating to excessive surface runoff and such areas will be avoided.

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Access to the LMPA would be via U.S. Highway 189 and numerous existing improved roads. The existing road network was developed to access prior and ongoing drilling and production activities, as well as other land use activities on Federal surface. All new access roads would be constructed specifically for natural gas well field development. Roads will be designed to minimize disturbance, and all surface disturbance will be contained within the road ROW. In the event drilling is non-productive, all disturbed areas, including the well site and new access road, would be reclaimed to the approximate landform that existed prior to construction. If drilling is productive, all access roads to the well site would remain in place for well servicing activities. Partial reclamation would be completed on segments of the well pad and access road ROW no longer needed. Each new well within the LMPA would require an average of 500 feet of new roads or upgrades of existing roads, and an average of 500 feet of new gas and water collection lines would be installed in a 50-foot wide facilities corridor. Where possible, flow pipelines would be routed adjacent to the new roadway ROW to minimize surface disturbance.

The majority of soil disturbance would be well away from stream channels, as required by RMP management directives (USDI-BLM 1997) ("within 500 feet of or on 100-year floodplains, wetlands, or perennial streams and within 100 feet of the edge of the inner gorge of intermittent and large ephemeral drainages"). Authorization of the Proposed Action would require full compliance with the RMP management directives that relate to surface water protection, Executive Order 11990 (floodplains protection), and the CWA in regard to protection of water quality and compliance with Section 404 permits. These directives require avoidance of stream channels to the maximum extent possible. Where total avoidance is not possible, the minimization of impacts to streams and associated floodplains/floodways must be implemented and the operator would be required to show the BLM AO why such resources cannot be avoided and how impacts would be minimized. These regulations also require that certain permits/authorizations be obtained for project implementation including a NPDES permit (needed for surface discharge); development of a surface runoff, erosion, and sedimentation control plan; oil spill containment and contingency plan; as well as CWA Section 404 permits. Given these conditions, adverse sedimentation is not expected to occur as a result of the implementation of the Proposed Action.

Most of the ephemeral drainage channels identified on Figure 3-2 are classified as waters of the U.S. Crossings of these channels and any associated wetlands would require authorization from the COE through the CWA Section 404 permitting process. However, these channel crossings would likely receive expedited authorization from the COE through Nationwide Permits No. 12 (buried utility lines) and/or No. 14 (minor road crossing fills) and No. 18 (minor discharges) as well as Programmatic General Permit 98-08. Other project facilities could not be located in waters of the U.S.; therefore, Section 404 permitting would not be necessary for such facilities. Each individual channel crossing would be reviewed during the APD/ROW permitting process for specific permit requirements under Section 404 and the CWA. Given these conditions, wetland damage is not expected to occur as a result of the implementation of the Proposed Action.

There is a remote chance that road and pipeline construction across established channels could adversely modify flow hydraulics. However, with correct design of channel crossings, including design for 25- to 50-year runoff events, no adverse impacts are expected. As discussed in Chapter 3, drainage channels in the project area are predominantly ephemeral. Therefore, it is unlikely that project activities would lead to an increase in sedimentation enough to adversely affect the quality of surface waters.

Reserve pits would be constructed to all contain drilling fluids, cuttings, and water produced during drilling. The operator proposes to use lined reserve pits at all drill site locations. The reserve pit would be lined with an impermeable poly liner or drilling mud gel (bentonite) to prevent seepage. Bentonite or synthetic lining would be used where appropriate as defined during the APD review. The synthetic poly liner would be at least 12 mils thick, reinforced with a bursting strength of 174 x 175 pounds per inch (ASTMD 75719), resistant to decay from sunlight and hydrocarbons, and compatible with the drilling fluids to be retained. Leakage of the pit fluids would be minimal from lined reserve pits unless the liners were installed incorrectly or the liners were damaged during drilling operations. Thus, adverse impacts from leaks in reserve pits would likely not occur.

Water for drilling purposes would be obtained from three existing water source wells located within the LMPA. Assuming no re-use of drilling water, each well would require approximately 189,000 gallons of water for well completion, well stimulation, and dust control. This water demand is relatively small and would not adversely affect existing surface or groundwater sources or rights.

Handling and management of hydrostatic test water, if used by the operator, would be accomplished in a manner that does not adversely affect soils, stream channels, and surface water and groundwater quality. After testing operations are completed, the water would be pumped into water hauling trucks and transported to drilling locations within the project area and used in conjunction with the drilling operations. However, if such water is not re-used it would be disposed of in a manner where soil scouring and water quality impairment would not result. Hydrostatic test water would be evaluated for compliance with State water quality standards. No test water would be discharged unless such water meets these standards. Test water not needed for drilling operations that meets water quality standards would be disposed of onto undisturbed land having vegetative cover or into an established drainage channel in a manner as not to cause accelerated erosion.

If a well is productive, site erosion and off-site sedimentation would be controlled by promptly revegetating sites in the first appropriate season (fall or spring) after drilling, and providing surface water drainage controls, such as berms, sediment collection traps, diversion ditches and erosion stops as needed. These measures would be described in the individual APD/ROW. If a well is not productive, all facilities constructed for its drilling and completion would be reclaimed according to APD conditions of approval.

Methods used for the disposal of produced water (water produced in association with the natural gas which is separated out at the well location) would vary but would generally be accomplished by surface evaporation in lined ponds.

4.4.1.1.2 Groundwater

The producing geologic formation in the LMPA is the Frontier Formation and the drilling depths would vary between approximately 9,000 feet and 11,000 feet. Compliance with "On-Shore Oil and Gas Order No. 2" will assure that the project will not adversely affect groundwater quality. Due to the state-of-the-art drilling and well completion techniques, the possibility of adverse degradation of groundwater quality by the Proposed Action would be negligible.

Well completion must be accomplished in compliance with "On-Shore Oil and Gas Order No 2". These guidelines specify the following:

> *"...proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall*

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receive approval prior to use".

Usable water is defined as groundwater with a TDS of 10,000 ppm or less encountered at any depth. To comply with the order, wells must be completed such that either usable water is isolated from "unusable" water, or that unusable water is isolated from usable water through the use of cementing and other proven technologies. Assuming compliance with this order, no contamination of usable groundwater would likely occur. Well drilling and completion as proposed in Chapter 2 appears to comply with the onshore order.

No springs or seeps have been identified within the project area. If any should be discovered during the life of the project, the exact locations and associated water-bearing strata of such surface expressions of groundwater would be evaluated during the site-specific analysis conducted for all components at the APD stage. Further, all construction activities and storage of petroleum products would be kept away from any seeps and springs (a minimum distance of 200 to 600 feet depending on the type of spring); therefore, contamination would be unlikely.

As discussed in Chapter 3, SEO records identify one active permitted groundwater right in the project area. The well is designated for livestock use. Due to the high improbability of groundwater quality degradation, the potential of impacts to holders of existing groundwater rights in the LMPA is remote.

4.4.1.2 Alternative A – No Action

The No Action Alternative would deny the proposal as submitted, but would allow consideration of individual APD's on federal lands on a case-by-case basis through individual project and site-specific environmental analysis. The No Action Alternative is expected to result in less impact than that described for the Proposed Action.

4.4.2 Mitigation

No mitigation measures or procedures would be required to minimize impacts to water resources.

4.4.3 Cumulative Impacts

Aside from limited oil and gas exploration and production, no other resource developments currently occur within or near the proposed project area. No mitigation measures or procedures other than those proposed by Burlington and the management direction contained in the Green River RMP (USDI-BLM 1997) would be required to minimize cumulative impacts to water resources.

4.4.4 Residual Impacts

No adverse residual impacts would result from project implementation of the RMP management directives and specific mitigation measures discussed above, and with adherence to the CWA and EO 11990.

4.5 VEGETATION, WETLANDS AND NOXIOUS WEEDS

4.5.1 Impacts

4.5.1.1 Proposed Action

4.5.1.1.1 Vegetation

Potential impacts to existing native shrub/grassland communities resulting from project implementation may include direct impacts such as disturbance, reduction, and/or removal of vegetation. Potential indirect impacts to the vegetation resource could occur as a result of soil compaction, mixing of soil horizons, loss of topsoil productivity, increased soil surface exposure, soil loss due to wind and water erosion, and damage to biological soil crusts (Belnap et al. 2001).

The Proposed Action assumes construction of 31 wells and associated roads and pipelines. Construction and installation of well sites, access roads, and ancillary facilities (including pipelines) would directly reduce the extent of vegetation cover types. Over the estimated three-year development phase (depending on drilling success), the Proposed Action would involve surface disturbance of about 91.4 acres (Table 2-1) which represents about 2.4% of the LMPA land surface area. This disturbance would be distributed among the primary and secondary vegetation types on the LMPA identified by Merrill et al. (1996). For purposes of this analysis it was assumed that disturbance associated with roads and pipelines would be located in the same vegetation cover type as the proposed well location.

Analysis of initial construction disturbance upon vegetation types is based on the approximate location of proposed wells prior to construction. As stated in the LMPA Scoping Statement, actual placement and number of wells may change as development proceeds. All 31 proposed new wells would be located in the Wyoming big sagebrush primary cover type, which represents about 2.4% of this cover type.

Twenty-six wells would be located in the mixed grass prairie secondary cover type with a total disturbance of 78.8 acres or about 2.4% of this cover type. Five wells would be located in the desert shrub secondary cover type with a total disturbance of 12.6 acres or about 2.4% of this cover type.

During the production phase of the project, pipelines and about 1.0 acres of each initial 1.8-acre well pad will be reclaimed along with both the back slopes and fore slopes of all roads with the exception of 30 feet of useable road surface. Therefore, total vegetation disturbance would be reduced from about 91.4 acres to about 40.0 acres (1.0% of the LMPA) after successful reclamation during the LOP. This total assumes all 31 well are productive; the LOP total could be decreased further if non-productive wells are encountered and affected well pad area(s) and associated road(s) are reclaimed earlier than currently anticipated.

In general, the extent of these impacts will be influenced by success of mitigation and reclamation efforts and the time period required for disturbed areas to return to pre-existing conditions. Reclamation success, in part, depends on the amount of surface area disturbed and quality of topsoil salvaged and stockpile/redistribution methods in disturbed areas. Re-vegetation efforts would be implemented in accordance with APD and BLM mitigation guidelines

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after cessation of surface-disturbing activities and original contour and grade are achieved as explained in Section 2.2.2.9

4.5.1.1.2 Wetlands

Due to a paucity of wetland/riparian sites on the LMPA, the probability of well pads, roads, or pipelines impacting these resources is low. The RMP specifies that a 500-foot (minimum) buffer around riparian and other water resources will be maintained. Permits under Section 404 of the CWA would be required for any activities in wetlands. Burlington would be required to demonstrate to the COE that there are no "practical alternatives" to placement of a well location in a wetland. The probability of impacting wetlands and other waters of the U.S. under the Proposed Action is low given the xeric nature of the LMPA and identified mitigation procedures stated in Chapter 2, Burlington's APD's, the RMP, COE and BLM surface-disturbing guidelines.

4.5.1.1.3 Noxious Plant Species

Surface-disturbing activities could increase the potential for establishment and spread of invasive (includes noxious) plant species. Invasive species, especially weeds, usually thrive on newly disturbed surfaces such as road and pipeline ROW's and readily out-compete more desirable and indigenous plant species. Burlington would be responsible for the management and control of all invasive weed infestations on project-related surface disturbances during the projected LOP and will consult with the BLM AO and/or local Sweetwater County Weed and Pest Control District authority for acceptable weed control methods.

Appendix 9-2 of the RMP provides guidelines for herbicide utilization within the RSFO management area. In addition, Appendix 5-1 of the RMP specifies that herbicide loading sites will be located at least 500 feet from live water, floodplains, riparian areas, and all special status species plant locations. In addition, aerial spraying of chemicals would be prohibited within ¼ mile of special status plant locations, and hand-application would be prohibited within 500 feet. Control measures would adhere to those allowed in the *FEIS, Vegetation treatment of BLM lands in the thirteen western states* (USDI-BLM 1991).

4.5.1.2. Alternative A - No Action

The No Action Alternative would deny the proposal as submitted but would allow consideration of individual APD's on federal lands on a case-by-case basis through individual project and site-specific environmental analysis. Transport of natural gas products would be allowed from those wells within the LMPA that are currently productive. Additional gas development could occur on State and private lands within the project area under APD's approved by the WOGCC.

Direct and indirect impacts to vegetation and wetland/riparian areas could continue as additional exploratory and development activities beyond this project are permitted. Given the current unknown extent of these activities it is not possible to reasonably predict what future impacts may occur under the No Action Alternative.

4.5.2 Mitigation

No mitigation measures for soil resources are recommended.

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4.5.3 Cumulative Impacts

The Proposed Action would temporarily add to the cumulative removal of vegetation within the area. Any non-permitted impacts to riparian/wetland areas would add to the cumulative loss in Wyoming and the Continental U.S. Planned or incidental use of existing field infrastructure and facilities (e.g., well pads, roads, pipeline corridors) by Burlington would reduce the potential long-term cumulative impacts to both of these resources. Because of the widespread distribution and abundance of Wyoming big sagebrush/mixed grass prairie cover type in this portion of Wyoming, minor reductions in these upland cover types would not be a adverse cumulative impact.

4.5.4 Residual Impacts

No residual impacts to vegetation resources would occur with implementation of and compliance with mitigation measures and stipulations stated in Chapter 2, Burlington's APD's, the RMP, and BLM surface-disturbing mitigation guidelines, recognizing that complete revegetation to pre-existing conditions (especially the shrub component) may require several decades in the arid (<10 " precipitation) environment of the project area, depending in great part, on future climatic conditions and land-use patterns.

4.6 RANGE RESOURCES

4.6.1 Impacts

4.6.1.1 Proposed Action

Sheep and cattle grazing would continue on the LMPA and Eighteen Mile grazing allotment during the drilling, field development and operations phases of the project. The primary impact to grazing resources would be short-term loss of available forage as a result of construction and production-related disturbance sites. These sites, except for roads, production equipment and ancillary facilities would be reclaimed as soon as practicable

Assuming all 31 wells are successful, the Proposed Action would result in an estimated initial 91.4 acres of short-term disturbance (about 2.4% of the total project area) or about 0.04% of the 245,659 acres encompassed within the Eighteen Mile grazing allotment (D'Ewart 2003). During the anticipated LOP, this total is estimated to decrease to about 40.0 acres (1.0% of the total project area) or about 0.02% of the total land area of the grazing allotment.

The average stocking rate for the Eighteen Mile grazing allotment is about 13 acres per AUM (D'Ewart 2003). Consequently, the Proposed Action would result in a short-term loss of about 7 AUM's, and long-term loss of about 3 AUM's. These losses would amount to substantially less than one percent of the 18,925 permitted AUM's for the Eighteen Mile allotment (D'Ewart 2003). Depending upon the success of drilling productive wells, long-term reduction of AUM's could be less than currently calculated. For example, in the Lincoln Road Unit, approximately 10% of wells drilled were non-producing wells and have been subsequently plugged, abandoned, and reclaimed. If a minimum of 10% of the proposed new 31 wells are non-producing, an additional 3 well pads and their associated facilities and access roads would be reclaimed earlier than currently projected.

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Under the Proposed Action, the estimated initial and LOP disturbed acres and associated AUM reductions represent less than 1.0% of the total land area and permitted AUM's, respectively, and would not be considered adverse. In addition, Burlington would reclaim unneeded and illegal roads, which would offset loss of forage from new construction.

Reclamation of disturbed sites with grasses and forbs could cause a localized increase in the availability of livestock forage and depending upon the intensity of use (grazing by wildlife, wild horses, and livestock) could interfere with revegetation success of reclaimed areas and fencing may be required to avoid overuse and to assure successful reclamation of the site.

Prevention and control of invasive weed species would be a positive impact to livestock by reducing competition with indigenous plants, thereby maximizing forage production.

The Proposed Action increases the potential for livestock/vehicle collisions. However, if Burlington advises project personnel regarding appropriate speed limits on designated access roads and these instructions are complied with, the likelihood of livestock/vehicle collisions will be minimized.

4.6.1.2 Alternative A - No Action

Under the No Action Alternative, disturbances to the rangeland resource located in proximity to roads and existing facilities would continue due to vehicular use and continued gas field-related activities. Consideration of individual APD's by the BLM on federal lands could continue on a case-by-case basis through individual project and site-specific environmental analysis. Additional gas development could occur on State lands within the LMPA under APD's approved by the WOGCC. Given these conditions, it may be assumed that further impacts will occur in the project area; however, the duration and extent of these impacts are not known at this time.

4.6.2 Mitigation

Burlington should coordinate with affected livestock operators to minimize disruption during livestock operations, including calving and lambing. In addition, as noted in Chapter 2, once the new roads are constructed, Burlington would reclaim existing illegal shortcut roads in the LMPA and sign them for no commercial use. No additional measures would be required other than those specified in Chapter 2, Burlington's APD's and by existing RMP and BLM standard mitigation practices for surface-disturbing and disruptive activities.

4.6.3 Cumulative Impacts

Existing land management and use activities that have impacted the general project area in various degrees include livestock grazing, and road construction. Use would continue during the LOP, estimated to be 15-20 years. The long-term impacts would be the loss of forage associated with roads and infrastructures that are not reclaimed within 5 to 20 years.

Successful revegetation of disturbed sites with grasses and forbs would cause a localized increase in the availability of livestock forage over time. Depending upon the intensity of use, grazing could interfere with revegetation of reclaimed areas. The loss of forage from disturbance would be temporary and lasting until areas are revegetated, approximately 3 to 5 years after reseeding.

Long-term production-related disturbances such as portions of well pads and road surfaces would convert rangeland to an industrial use for the life of the facility. Because the project area overlies an existing gas field, the surrounding rangeland landscape has already been altered to an industrial landscape and additional disturbance would continue to encroach on to natural rangeland and their historic uses. The long term production related disturbances would make a larger industrial landscape footprint with additional infrastructure.

The Proposed Action increases the potential for livestock/vehicle collisions. However, if Burlington advises project personnel regarding appropriate speed limits on designated access roads and these instructions are complied with, the likelihood of livestock/vehicle collisions will be minimized.

4.6.4 Residual Impacts

No adverse residual impacts would occur with project implementation, assuming successful implementation of the proposed measures to avoid or reduce adverse impacts to minimum levels.

4.7 WILDLIFE

4.7.1 Impacts

4.7.1.1 Proposed Action

Over the three-year proposed drilling period, approximately 31 wells will be drilled, disturbing approximately 91.4 acres (2.4% of the project area) of general wildlife habitat. During the production phase, the unused portion of well sites and roads, as well as pipelines (a total of 51.4 acres) would be reclaimed. Following completion of production operations (life of the project is estimated at 15-20 years), the well field and ancillary facilities would be reclaimed and abandoned. Well pads would be removed and the areas revegetated with seed mixes approved by the BLM, some of which are specifically designed to enhance wildlife use. The duration of impacts to vegetation would depend, in part, on the success of mitigation and reclamation efforts and the time needed for natural succession to return revegetated areas to predisturbance conditions. Grasses and forbs are expected to become established within the first several years following reclamation, however, much more time would be required to achieve reestablishment of shrub communities. Consequently, disturbance of shrub communities, particularly mixed shrub communities that big game utilize during winter, would result in a long-term loss of those habitats.

In addition to the direct loss of habitat due to construction of well pads and associated roads and pipelines, disturbances from human activity and traffic would lower the utilization of habitat immediately adjacent to these areas. Species that are sensitive to indirect human disturbance (noise and visual disturbance) would be impacted most. Habitat effectiveness of these areas would be lowest during the construction phase when human activities are more ubiquitous and intensive. Disturbance would be reduced during the production phase of operations and many animals may become accustomed to equipment and facilities in the gas field and may once again use habitats adjacent to disturbance areas.

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4.7.1.1.1 General Wildlife

The direct disturbance of approximately 91.4 acres of wildlife habitat under the Proposed Action would reduce habitat availability and effectiveness for a variety of common small mammals, birds and their predators. The initial phases of surface disturbance would result in some direct mortality and displacement of songbirds and small mammals from construction sties. In addition, some increase in mortality from increased vehicle use of roads in the project area is expected. Quantification of these losses is not possible; however, the impact is likely to range from low to moderate over the short-term. Due to the relatively high production potential of these species and the relatively small amount of habitat disturbed, small mammal and songbird populations would quickly rebound to pre-disturbance levels following reclamation of pipelines, unused portions of roads, well pads, and wells that are no longer productive. No long-term adverse impacts to populations of small mammals and songbirds are expected.

4.7.1.1.2 Big Game

In general, impacts to big game species would include direct loss of habitat and forage, and increased disturbance from drilling, construction, and maintenance operations. Disturbance of big game species during the parturition period and on winter range can increase stress and may influence species distribution (Hayden-Wing 1980, Morgantini and Hudson 1980). There may also be a potential for an increase in poaching and harassment of big game, particularly during winter. The potential for vehicle collisions with big game would likely increase as a result of increased vehicular traffic and speeds associated with the presence of construction crews and would continue (although at a reduced rate) throughout all phases of the operations.

Pronghorn. All of the project area is classified as spring/summer/fall pronghorn range and sustains some use by pronghorn throughout the year. All proposed wells would be located in spring/summer/fall pronghorn range; total disturbance associated with these wells would be approximately 91.4 acres (2.4%) of spring/summer/fall range in the project area. Following reclamation, approximately 40.0 acres of spring/summer/fall pronghorn range would remain disturbed for the remaining LOP.

Activities associated with the construction phase of the project would likely temporarily displace some pronghorn, however, once construction is complete pronghorn will likely habituate and return to pre-disturbance activity patterns. Reeve (1984) found that pronghorn acclimated to increased traffic volumes and machinery as long as the traffic and machines moved in a predictable manner. The displacement of pronghorn and disturbance of habitats is considered a short-term impact because of the temporary nature of the displacement and the availability of comparable habitats in adjacent areas.

4.7.1.1.3 Wild Horses

An estimated 91.4 acres will initially be affected by the Proposed Action, which represents about 0.02% of the total land surface of the Little Colorado HMA. The 91.4 acres will decrease to approximately 40.0 acres during the LOP or about 0.008% of the HMA. Any impacts of vegetation disturbance/removal on wild horses due to project activities are anticipated to be minor because of the small land area affected.

By their nature, free-roaming wild horses have shown the capacity to disperse over wild areas in search of food and water, seek shelter, or to escape insect pests and human activity. Movement of wild horses in the Little Colorado HMA has been documented to include seasonal elevational movements in response to snow and winter conditions as well as shorter

movements to higher elevation habitats in summer to escape heat and insect pests. Therefore, displacement of wild horses resulting from the Proposed Action is expected to be minimal.

Primary public access to view wild horses in and near the project area is via U.S. Hwy 189 and numerous existing improved roads and the Proposed Action would not affect the opportunity for the public to view wild horses.

4.7.1.1.4 Upland Game Birds

Greater Sage-grouse. According to the RSFC, there are no known greater sage-grouse leks on or within two miles of the project area. If all avoidance and mitigation measures identified in this document and the RMP are implemented, impacts to greater sage-grouse are expected to be minimal if they are found to occur.

Mourning Dove. Mourning doves are found in the project area; therefore it is possible that some breeding activity and nesting occurs on the project area during the spring and summer. The project area is located in UGMA #7, in which only 1.9% of the state's total harvest of mourning doves occurred in 2001 (WGFD 2002b). If all avoidance and mitigation measures identified in this document and the RMP are implemented, impacts to mourning doves are expected to be minimal.

4.7.1.1.5 Waterfowl and Shorebirds

Although habitat for waterfowl and shorebirds is minimal on the project area, there is a possibility of incidental use by a number of different species because of suitable habitat within the region. Given mitigation measures for water resources identified in this document and in the RMP, it is expected that the Proposed Action would not have adverse impacts upon waterfowl or shorebirds.

4.7.1.1.6 Raptors

Impacts to raptor species are not expected because the project area does not contain good raptor nesting media (trees, broken topography cliffs) and the records of the RSFO indicate that there are no raptor nests on or within two miles of the project area. However, it is likely that raptors hunt in the general area since WOS records (WGFD 2002d) show that 12 species have been observed on or within six miles of the project area. When, or if, active raptor nests are located on or within one mile of the project area during the development period, appropriate avoidance and mitigation measures would be taken to avoid adverse impacts to breeding raptors.

4.7.1.2 Alternative A - No Action

Under the No Action Alternative, disturbances to the wildlife species and their habitats would be expected to be similar to those described for the Proposed Action, but of a lesser magnitude. Consideration of individual APD's by the BLM could continue on a case-by-case basis through individual project and site-specific environmental analysis. Given these conditions, it may be assumed that further impacts will occur in the project area; however, the duration and extent of these impacts are not known at this time.

4.7.2 Mitigation

No additional mitigation for the wildlife resource is proposed.

4.7.3 Cumulative Impacts

The cumulative impacts of this proposed project upon wildlife populations and habitats are expected to be minimal, provided the guidelines and mitigation measures contained in this document and the RMP are implemented.

4.7.4 Residual Impacts

Although the potential impacts associated with the Proposed Action would be non-adverse, the effects of some would persist until they were off-set over time. Construction of new roads may also cause long-term impacts such as increased human disturbance of wildlife near those roads and an increased potential for wildlife/vehicle collisions, poaching, and harassment.

4.8 SPECIAL STATUS WILDLIFE, FISH AND PLANT SPECIES

4.8.1 Impacts

4.8.1.1 Proposed Action

4.8.1.1.1 Threatened, Endangered or Proposed for Listing Species of Wildlife, Fish, and Plant

Because the following fish species occur within the general region (USDI-FWS 2002a), of which the project area is a part, potential impacts to these species caused by the Proposed Action are considered.

Fish. Formal consultation with the FWS for endangered fish species found in the Upper Colorado River System has been completed. Consultation concluded that since water depletions would average 6.00 acre-feet per year, or 18.00 acre-feet for the project, is below the threshold of 100 acre-feet criteria set for the recovery program, the depletion fee has been waived (May 2, 2003). No further direct, indirect, or cumulative impacts to endangered fish are anticipated.

4.8.1.1.2 Sensitive Wildlife, Fish, and Plant Species

Although these species have no legal protection under the ESA, the BLM and FWS still maintain an active interest in their numbers and status. All of these species may have the potential to occur on or near the project area (USDI-BLM 2002) and, therefore, potential impacts to them, which may be caused by the Proposed Action, are considered.

The following wildlife species have the highest potential to occur on the LMPA: swift fox, Wyoming pocket gopher, pygmy rabbit, sage thrasher, loggerhead shrike, Brewer's sparrow, sage sparrow, mountain plover, white-faced ibis, midget-faded rattlesnake, and Great Basin spadefoot toad. Since suitable habitats for the remaining sensitive wildlife and plant species (Table 3-11) do not occur on the project area, the likelihood of impacts associated with the Proposed Action is expected to be non-adverse.

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Swift Fox. Some portions of the project area may provide limited foraging opportunities, however, swift foxes are very adaptable, and the limited amount of disturbance would not be a adverse impact if they are present on the LMPA.

Wyoming Pocket Gopher. It is possible that the Wyoming pocket gopher is present in portions of the LMPA. This species utilizes dry ridge tops with dry gravelly soils and greasewood. This species may be abundant within its distribution, but no population studies have been conducted (Clark and Stromberg 1987). No adverse impacts to this species are expected with development of the Proposed Action.

Pygmy Rabbit. Pygmy rabbits are limited to areas of dense and tall big sagebrush (Campbell et al. 1982, Clark and Stromberg 1987, Heady et al. 2002). Although the project area is dominated primarily by Wyoming big sagebrush, no pygmy rabbit occurrence has been reported within six miles (WGFD 2002d, WYNDD 2002). The possibility exists that pygmy rabbits could occur there; however, it is unlikely the population would be adversely impacted because only 2.4% of the Wyoming big sagebrush habitat would be disturbed. If pygmy rabbits are found to occur on the project area, potential impacts could be reduced by avoiding well, road, and pipeline placement within areas of tall dense sagebrush.

Sage Thrasher. The sage thrasher is considered a sagebrush obligate and is generally dependent on large patches and expanses of sagebrush steppe for successful breeding. Sage thrashers have been observed throughout Wyoming, although there are no records of them occurring within six miles of LMPA (WGFD 2002d). Development of the Proposed Action could displace some sage thrashers, however, suitable habitat is very abundant throughout the project area, and no adverse impacts to this species are expected.

Loggerhead Shrike. No records of loggerhead shrikes are documented within six miles of the LMPA; however, it is possible that they utilize portions of the project area during the nesting season. Construction within shrub habitats may possibly disturb nesting shrikes if they are found to occur on the project area. However, facilities associated with well development may provide increased perching sites, which shrikes use for hunting. Implementation of the Proposed Action is not likely to adversely affect the loggerhead shrike.

Brewer's Sparrow. The Brewer's sparrow breeds in landscapes dominated by big sagebrush (*Artemisia tridentata*) throughout the Great Basin and intermountain West (Rotenberry et al. 1999). Brewer's sparrows are likely present throughout the project area where suitable habitat occurs. Development of the Proposed Action could displace some Brewer's sparrows, however, suitable habitat is very abundant throughout the project area, and therefore, no adverse impacts to this species are expected.

Sage Sparrow. Sage sparrows typically utilize stands of big sagebrush or mixed big sagebrush and greasewood for nesting. It is possible that the sage sparrow, a sagebrush-obligate species, may be present within the LMPA. Because of the small amount of disturbance associated with the project, their inherent mobility, and the availability of suitable habitats on undisturbed land, the effects on these species should be minimal.

Mountain Plover. According to the RSFO, habitats suitable for mountain plover are unlikely to occur on the project area, and impacts to this species are not expected.

White-faced Ibis. Suitable habitat for the white-faced ibis does not exist on the project area;

therefore no adverse impacts to the ibis from the Proposed Action would be expected to occur.

Midget-faded Rattlesnake. In Wyoming, the midget-faded rattlesnake inhabits the lower Green River valley from the cities of Green River and Rock Springs south to the Utah-Wyoming state line. In southwestern Sweetwater County the midget faded rattlesnake is commonly found among rock outcroppings (Baxter and Stone 1992). The project area is outside the known distribution range of the midget-faded rattlesnake and potentially suitable habitats do not occur there. The species is not likely to inhabit the project area and implementation of the Proposed Action is not expected to cause impacts.

Great Basin Spadefoot Toad. Limited habitat exists in the area; however, it is possible that Great Basin spadefoots utilize the intermittent and temporary water sources for breeding during years with adequate moisture. If measures are taken to avoid disturbance of water sources, no adverse impacts to this species are expected from implementation of the Proposed Action.

Fish. The drainages in the project area are ephemeral or intermittent. Five fish species of special concern occur downstream of the LMPA: roundtail chub, bluehead sucker, flannelmouth sucker, Colorado River cutthroat trout, and the leatherside chub (USDI-BLM 2002). Produced water would be stored temporarily in lined reserve pits at all drill site locations and later backfilled (see Section 2.2.2.2), and project activities are not expected to affect these fish species of concern found downstream from the LMPA.

Plants. The probability of occurrence of habitats for plant species of concern on the proposed project area is low (Glennon 2003), therefore, no adverse cumulative impacts to these habitats are anticipated due to project implementation.

4.8.1.2 Alternative A - No Action

Under the No Action Alternative, disturbances to the special status wildlife, fish, and plant species and their habitats would be expected to be similar to those described for the Proposed Action, but of a lesser magnitude. Consideration of individual APD's by the BLM could continue on a case-by-case basis through individual project and site-specific environmental analysis. Given these conditions, it may be assumed that further impacts will occur in the project area; however, the duration and extent of these impacts are not known at this time.

4.8.2 Mitigation

No additional mitigation for sensitive species is proposed.

4.8.3 Cumulative Impacts

The cumulative impacts of the proposed project upon special status wildlife, fish, and plant species and their habitats are expected to be minimal, provided the guidelines and mitigation measures contained in this document and the RMP are implemented.

4.8.4 Residual Impacts

No residual impacts are expected to occur with project implementation, assuming successful implementation of the proposed measures.

4.9 RECREATION

4.9.1 Impacts

4.9.1.1 Proposed Action

The LMPA is located in an existing oilfield, the Little Monument II Unit. Recreation use in the LMPA and immediately adjacent areas is believed to be minimal, at least in part because of the level of oil and gas development in the area and the availability of more desirable recreation resources such as Fontenelle Reservoir and Seedsakdee NWR. Relatively few recreation visitors access the east side of Fontenelle Reservoir (Butterfield 2003). Conflicts between natural gas activities and recreation use of Fontenelle Reservoir are unlikely.

Consequently, few, if any, recreation users would be displaced by drilling and field development activities. Impacts to the recreation resource would not be adverse due to the short-term nature of drilling and construction activities and small number of recreation users affected.

4.9.1.2 Alternative A - No Action

Under the No Action Alternative, natural gas development could occur on federal lands, on a case-by-case basis. Therefore, implementation of the No Action Alternative could result in recreation effects similar in nature to those described for the Proposed Action, but likely at reduced levels. These impacts would not be adverse.

4.9.2 Mitigation

Given the minimal level of recreation impacts anticipated, no additional recreation mitigation measures are proposed.

4.9.3 Cumulative Impacts

The pace of drilling and field development in southwest Wyoming and in the Fontenelle area has been accelerating in recent years. Because the Proposed Action would be located within an area of existing oil and gas development, it would only minimally add to the level of cumulative impact to regional recreation resources.

4.9.4 Residual Impacts

No residual recreation impacts are anticipated.

4.10 VISUAL RESOURCES

4.10.1 Impacts

4.10.1.1 Proposed Action

The LMPA is located in an existing oil and gas field, and the region containing the LMPA has been classified as VRM Class IV by the BLM, which allows for major modification of the character of the landscape, with appropriate mitigation measures to reduce visual impacts.

Impacts to visual resources associated with Proposed Action-related construction and drilling in the LMPA would include contrasts in line, form, color, and texture. In the short term, these contrasts would be associated with surface disturbance, drilling rigs, construction equipment, service trailers and the general industrial character of drilling activities. Additional impacts could occur from fugitive dust produced by construction activities. In the longer term, contrasts would be associated with well facilities, access roads and ancillary facilities.

Potential reviewers of these contrasts would be primarily oil and gas field workers, grazing operators and recreation users passing through the area. Activity in the LMPA would not be visible from the surface or shoreline of Fontenelle Reservoir.

The Proposed Action would result in an intensification of the existing visual character within the LMPA, but would be within the guidelines for VRM Class IV areas. No adverse long-term impacts are anticipated given proposed mitigation measures.

4.10.1.2 Alternative A – No Action

Under the No Action Alternative, natural gas development could occur on federal lands, on a case-by-case basis. Therefore, implementation of the No Action Alternative could result in visual effects similar in nature to those described for the Proposed Action, but at reduced levels. These impacts would not be adverse.

4.10.2 Mitigation

No mitigation would be required.

4.10.3 Cumulative Impacts

The LMPA is located in a portion of southwest Wyoming that has been highly modified due to historic and ongoing oil and gas development. The Proposed Action and perhaps, to a substantially lesser degree, the No Action Alternative would intensify the regional visual modification, but would not substantially expand the modified area. Consequently neither alternative would more than minimally add to the cumulative visual impact in the region, particularly after drilling, field development and reclamation of disturbed areas is completed.

4.10.4 Residual Impacts

Even after application of mitigation measure, wellhead facilities, ancillary facilities and access roads would be visible for the life of the project, but these facilities fall within the guidelines for VRM Class IV areas; consequently, residual impacts would not be considered adverse.

4.11 CULTURAL RESOURCES

4.11.1 Impacts

Cultural resources on public lands, including archaeological sites and historic properties, are protected by various laws and regulations; for example the National Historic Preservation Act (NHPA) of 1966, as amended, and 36 CFR Part 800, the acts implementing regulations. The specific guidance can be found in "Archaeology and Historic Preservation: Secretary of the

Interior's Standards and Guidelines" (48FR44716). Laws and regulations concerning cultural resources stipulate the proposed undertaking take into consideration the effects of the action to significant cultural resources. This requires that cultural resources within the proposed area of potential effect (APE) must be identified and evaluated. Measures will be taken to mitigate or minimize adverse effects to historic properties included in, or eligible for, the NRHP.

The Little Monument project area data base contains seven sites in a 3,857-acre area. Sites include six prehistoric open camps (48SW5134, 48SW5135, 48SW5136, 48SW6924, and 48SW12064) and the Yellow Point Lithic Landscape (48SW10923). No historic sites have been recorded in the project area. None of the sites are eligible for the NRHP.

Potential impacts to specific eligible or unevaluated properties are unknown at this time. Only 18 projects have been conducted in the Little Monument project area. The LMPA encompasses approximately six square miles or 3,857 acres. Approximately 240 acres (block) or ca. 6.2% of the project area have been inventoried for cultural resources. There are no acreage calculations for the linear projects. The overall site density within the project area cannot be accurately calculated due to the paucity of projects conducted within the project area. Based upon the area surveyed and the number of sites identified, there might be as many as 105 unknown resources in the LMPA. Four sites have been recorded in Section 28 (48SW5135, 48SW5136, 48SW10919, and 48SW12064), one site (48SW6924) has been recorded in Section 21, and one site (48SW5134) has been recorded in Section 27. The Yellow Point Landscape (48SW10923) has been identified in all sections within the project area. Certain topographic settings have a higher archaeological sensitivity such as eolian deposits (sand dunes, sand shadows, and sand sheets), alluvial deposits along major drainages, and colluvial deposits along lower slopes of ridges. As development increases it is certain that the number of prehistoric sites will also increase.

4.11.1.1 The Proposed Action

Direct impacts would primarily result from construction related activities and would be considered adverse if lost information impeded efforts to reconstruct the prehistory or history of the region. Activities considered to have the greatest effect on cultural resources include blading of well pads and associated facilities, and the construction of roads and pipelines. Sites located outside the APE will not be directly affected by the construction activities. If the area of the site crossed by earth disturbing activities does not possess the qualities that contribute to the eligibility of the site, the project is judged to have no effect. Alteration of the environmental setting of eligible historic properties may be considered an adverse effect in the form of a direct impact. Indirect impacts would not immediately result in the physical alteration of the property. Indirect impacts to prehistoric sites primarily would result from unauthorized surface collecting of artifacts, which could physically alter the sites. At historic sites this could include bottle collecting and the introduction of visual impacts. In addition, unauthorized excavation in the project area would represent and adverse impact.

Gauging the effect of any impact depends on the level of information available for that particular property provided by inventory and/or testing data. If cultural resources on or eligible to the National Register are to be adversely impacted by the proposed undertaking, then the applicant, in consultation with the surface managing agency and the SHPO, shall develop a mitigation plan. Construction would not proceed until terms of the mitigation plan are satisfied.

4.11.1.2 Alternative A - No Action

Under the No Action Alternative, development would be approved on a case-by-case basis by the BLM, as described in Chapter 2. Impacts to cultural resources would be similar to those described above. In terms of magnitude, such impacts would likely be less than for the Proposed Action.

4.11.2 Mitigation

Mitigation procedures will be implemented if a site considered eligible or listed on the National Register is impacted. Avoidance is preferred and is achieved through redesign of a project, elimination of the project, or minimizing impacts. However, these means are not always possible. Mitigation of adverse effects to properties would be accomplished by the documentation of physical remains. Mitigation would include data recovery of prehistoric and historic sites and could include documentation through detailed drawings and photographs of standing structures. Data recovery plans are subject to review and approval by the BLM and SHPO, pursuant to BLM State Protocol agreement.

Mitigation could also include interpretation of significant resources, stabilization of resources, and research vital to understanding resources (e.g. paleoenvironmental studies). Such measures are routinely developed through consultation with SHPO and negotiations with the applicant.

4.11.3 Cumulative Impacts

Disturbance and/or loss of other unidentified sites or artifacts could add to the cumulative loss of information about our heritage in the project area and in the region if these sites or resources are not identified and inventoried prior to disturbance. Any loss or damage to unidentified cultural or historical sites or resources associated with the proposed project, combined with similar losses or damage due to mineral development could be substantial. Such losses are not expected because application of mitigation actions would be implemented.

4.11.4 Residual impacts

Avoidance of known significant cultural resources during the construction projects and implementation of Class III cultural resource inventories for the Proposed Action minimizes the potential for adverse impacts to cultural resources. Implementation of protective measures on all lands would result in the avoidance of impacts to cultural resources in the LMPA.

4.12 SOCIOECONOMICS

4.12.1 Impacts

4.12.1.1 Proposed Action

The socioeconomic assessment is based on the drilling of 31 natural gas wells over a three-year period. If fewer wells are drilled, or if wells are drilled over a longer period, the resultant socioeconomic effects would be less than those described in this assessment.

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Socioeconomic impacts of the Proposed Action would be largely positive. The project would enhance regional economic conditions and generate local, state and federal government tax and royalty revenues. The relatively small, short-term drilling and field development workforce would not generate significant demand for temporary housing or local government services. Consequently no adverse socioeconomic impacts would be anticipated.

Economic and Employment Effects

Development and operation of the Proposed Action would require goods and services from a variety of local and regional contractors and vendors, from the oil and gas service industry and from other industries. Expenditures by the proponent for these goods and services, coupled with employee and contractor spending, would generate both direct and indirect economic effects in southwest Wyoming, elsewhere in the State of Wyoming and in the nation as a whole.

For the Proposed Action, direct drilling and field development employment was estimated by assuming a three-year drilling and field development schedule, and assuming that wildlife and seasonal stipulations would reduce the drilling period to 212 days in any given year. Based on these assumptions, drilling and field development employment associated with the Proposed Action would require an estimated 3,000 to 3,400 worker days annually over the three-year period, or about 13 full-time annual job equivalents.

Drilling and field development employment would average about 16 workers per day during the 212-day annual drilling period, with peak days of as much as 33 workers.

Most drilling and field development work would be performed by contractors who would be on site for the duration of their task. In some cases, such as drilling contractors, these workers would work in the LMPA for several months at a time; in other cases, workers would be on site for a matter of days or hours.

During project operations, many tasks would be performed by existing Burlington employees. It is also assumed that an average of 2 additional fulltime employees would be required. Each well would require workover operations every two years, during which time a crew of 4 or 5 workers would work at the well for a variable number of days, depending on the workover activities required at each well.

The Proposed Action as described in Chapter 2 of this assessment would involve a substantial capital investment in natural gas wells and ancillary facilities. A recent study prepared by the University of Wyoming Agricultural Economics Department (USDI-BLM 2003), estimated employment, earnings and total economic impact associated with natural gas drilling and completion in the Jack Morrow Hills area, which is also located in southwestern Wyoming. The study estimated that a gas well drilled and completed to an average 9,000 feet would result in $620,784 in direct expenditures and would generate $847,000 in total economic impact, including $131,000 in earnings and 2.12 full time equivalent jobs (all estimates are in inflation-adjusted 2001 dollars).

The 31 wells associated with the Proposed Action are anticipated to range between 9,000 and 11,000 feet in depth. Based on the estimates contained in the UW study, the drilling phase of the Proposed Action would generate an estimated $19 million in direct expenditures, $26.2 million in total economic impact, $4 million in total earnings and 66 full-time equivalent jobs (direct and indirect).

The UW study also estimated the economic effects associated with 1,000 MCF of natural gas produced in southwest Wyoming at an average sales price of $2.81/MCF (2001$). These estimates included $2,793 in total economic impact in southwest Wyoming, $188 in earnings and .005387 jobs.

Based on Burlington's production forecasts, the 31 wells associated with the Proposed Action would produce an estimated 39,079 MMcf over 30 years. Based on the UW estimates, the 31 wells associated with the Proposed Action would generate an estimated total of $ 109 million in total economic impact in southwest Wyoming over 30 years, or an average annual economic impact of $3.6 million. This would include estimated total earnings of $7.3 million (an annual average of $243,000), associated with an annual average of 7 full-time equivalent direct and indirect jobs.

The foregoing assessment assumes that all wells will be successful. If some wells were dry, if production were less than anticipated, or if gas prices were lower than the U.S. Department of Energy, Energy Information Administration (EIA) forecasts, the economic effects of the project would be lower than those presented above. Conversely, higher rates of production and/or gas sales prices would produce higher economic effects.

Sweetwater County Oil and Gas Activity

Successful completion of the Proposed Action would increase natural gas production in Sweetwater County. Based on operator production forecasts, peak year Little Monument production (5,000 MMcf) would be about 2 percent of total 2001 Sweetwater County natural gas production.

Assuming that the 31 wells associated with the Proposed Action were drilled in three years, the annual increment in drilling would be about 3 percent of all Sweetwater County APD's approved in 2001.

Population Effects

Direct and indirect population effects of the Proposed Action would be minimal. Drilling and field development activities associated with the Proposed Action would be performed by contractors, who may come from Rock Springs, Green River, the Kemmerer/Diamondville area, the Farson/Eden area, La Barge, or the Big Piney/Marbleton area. Some contractors may also come for from elsewhere in Wyoming or from out of state. Non-local contractors and their employees would be likely to locate in communities near the LMPA temporarily, for the duration of their contract. Given the short-term nature of the drilling and field development phase of the project, non-local workers are likely to relocate single status, and return to their place of residence on their days-off and during periods when drilling ceases. The relatively few direct jobs associated with project operations would not generate measurable population effects.

The economic activity associated with the Proposed Action would result in increased employment opportunities in other sectors of the economy; however, these indirect jobs are likely to be dispersed across southwestern Wyoming and filled by existing residents rather than non-local workers. Consequently, little if any net population gain would occur as a result of the Proposed Action.

Housing Demand

Non-local drilling and field development workers associated with the Proposed Action would be likely to seek temporary housing resources in one of the several communities near the ' MPA. Existing temporary housing resources in these communities could accommodate the relatively small Proposed Action-related demand for temporary housing. The operations phase of the Proposed Action would not generate appreciable housing demand.

Community Facilities, Law Enforcement and Emergency Response Demand

The relatively small temporary population increases associated with the Proposed Action would be accommodated with existing county and municipal facilities. Emergency services demand associated with field development and operations activities would also be accommodated by existing Sweetwater or Lincoln County law enforcement and emergency management resources (Valentine 2003).

Fiscal Effects

The Proposed Action would generate certain state and local tax revenues including:

- local ad valorem property taxes on production and certain field facilities;
- sales and uses taxes to the State of Wyoming, Sweetwater County and its incorporated municipalities;
- mineral royalties to the federal government, a portion of which are returned to the State and local governments; and,
- state severance taxes.

Ad Valorem Taxes

The Proposed Action would generate ad valorem property tax revenue to Sweetwater County, the Wyoming School Foundation Fund, Sweetwater County schools and various taxing districts within the county. Ad valorem taxes would be generated from two sources: 1) the fair market value of methane produced and sold; and 2) the value of certain capital facilities within the well fields (all underground facilities associated with wells are exempt by state statute).

Constant 2003 Sweetwater County mill levies were used to prepare the following estimates. In reality some mill levies are set each year by the Sweetwater County Commissioners, officials of the various special and school districts and the state; some change each year. Mill levies reflect the revenue needs of the taxing entity and estimates of assessed valuation within the entity.

Based on Burlington's production estimates, US DOE Energy Information Administration price forecasts for natural gas (USDOE EIA 2003), and FY 2003 mill levies, the estimated Proposed Action-related gas production would generate a total of $7.7 million (2001$) in total ad valorem property tax revenues to Sweetwater County over the 30-year life of the project. Based on current distributions, about 70 percent of the total property tax revenues would be distributed to State and local schools, and about 17 percent would be distributed to Sweetwater County government.

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Federal Mineral Royalties

All of the 31 wells associated with the Proposed Action are anticipated to be on federal lands. The federal government collects a 12.5 percent royalty on the fair market value of gas produced from federal leases, less production and transportation costs. Half of mineral royalty revenues are returned to the state where the minerals were produced. In Wyoming, a portion of the state's share is distributed to local governments and to the Wyoming School Foundation Fund.

Based on Burlington's production estimates and US DOE EIA price forecasts for natural gas, an estimated total $11.7 million (2001$) in Federal Mineral Royalties would be generated by the Proposed Action; and approximately $5.8 million of that amount would be returned to the State of Wyoming. Actual Mineral Royalty revenues collected would vary based on actual production levels, gas sales prices, and production and transportation costs.

Wyoming Severance Taxes

The State of Wyoming collects a six percent severance tax on the fair market value of natural gas produced within the state. Federal mineral royalty payments and production and transportation costs are exempt from this tax. The state uses revenues from this fund for a variety of purposes (e.g., General Fund, Water Development Fund, Mineral Trust Fund, and Budget Reserve) and returns a portion to counties and municipalities.

An estimated total $4.9 million (2001$) in severance taxes would be generated by the Proposed Action. Actual severance tax revenues would vary based on actual production levels, gas sales prices, and production and transportation costs.

Sales and Use Tax

Wyoming levies a four percent sales and use tax on the gross receipts of tangible goods and certain services (drilling services are exempted). The state returns 28 percent of the revenue (less administrative costs) to the county and municipalities where the taxes were collected. Sweetwater County also levies a one percent local option sales and use tax, which is distributed to the county and its municipalities and a 0.5 percent facilities tax. Proceeds from the facilities tax will be used to fund construction of a new county jail.

In drilling the 31 wells associated with the Proposed Action, an estimated $11.5 million would be spent for goods and services subject to state and local sales and use taxes, based on UW estimates for wells of this depth. This amount would generate about $635,000 in total sales and use tax revenues, including $332,500 for the State of Wyoming and about $243,000 for Sweetwater County and its municipalities. The local option facilities tax would raise an estimated $58,000 from Proposed Action-related expenditures.

4.12.1.2 Alternative A - No Action

Under the No Action Alternative, natural gas development could occur on federal lands on a case-by-case basis. Therefore, implementation of the No Action Alternative could result in socioeconomic effects similar in nature to those described for the Proposed Action. Drilling and field development under the No Action Alternative is likely to be at a substantially reduced level as compared to the Proposed Action. Therefore socioeconomic effects of the No Action

Alternative (i.e., economic and fiscal effects, demand for temporary housing and community services) would be less than those described under the Proposed Action.

4.12.2 Mitigation

No adverse or substantial negative socioeconomic impacts are anticipated to be associated with the Proposed Action. The mitigation measures outlined in Chapter 2 would enhance the positive socioeconomic effects of the project. Burlington should coordinate emergency response planning with the Sweetwater County Emergency Management Agency. The anticipated revenues associated with the Proposed Action would provide revenues to local governments in Sweetwater County to compensate for the anticipated minimal Proposed Action-related demand for law enforcement and emergency response services. However, there would be a lag between the time development begins and the time substantial tax revenues flow to the county.

4.12.3 Cumulative Impacts

In recent years, southwest Wyoming has experienced an increase in the pace and level of natural gas development. While this increase in development will result in increased employment, income and tax revenues in the region, it will also result in increased housing demand and increased demand for local government facilities and services.

As described in Section 3.12, most communities near the LMPA are still below peak population levels of the 1980's and have infrastructure and housing to accommodate some population growth. Therefore the recent increase in natural gas drilling and field development has been largely positive for most southwestern Wyoming communities, helping slow population loss.

The pace of natural gas development in southwest Wyoming would have to increase dramatically to generate population growth at a level that would strain existing housing resources and community facilities. It is conceivable that world events may result in such a dramatic increase in demand, however, the substantial lead time that would be necessary to increase drilling and field development capabilities to accommodate a dramatic increase in demand should also allow these communities time to plan for growth.

4.12.4 Residual Impacts

No residual socioeconomic impacts are anticipated.

4.13 TRANSPORTATION

4.13.1 Impacts

4.13.1.1 Proposed Action

The relatively small level of increases in traffic associated with the Proposed Action could accelerate road maintenance requirements and increase the risk of accidents on state highways and county roads, but with successful implementation of mitigation measures these impacts would not be adverse.

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Transportation effects of the Proposed Action would occur primarily on WYO 372, US 189, LCR 311, SCR 8, SCR 52 and BLM Road 4202. These highways and roads provide access to Rock Springs, Green River and the Kemmerer/Diamondville area, and the bulk of heavy equipment, delivery and employee commuting trips are anticipated to occur along this access route.

Some contractors or workers could be hired from or seek temporary residence in Farson, Eden, La Barge, Big Piney or Marbleton. Contractors and workers from these areas could use the primary access routes identified above. But, secondary transportation effects could also occur on SCR 49, which provides access to the LMPA from the Farson/Eden area, and LCR 313 and 316, which provide access from US 189 for workers coming from the La Barge and the Big Piney/Marbleton area. A few workers coming from La Barge and Big Piney/Marbleton may also access the LMPA using LCR 318 and BLM Road 4210. Use of any of these routes is anticipated to be minimal. Transportation impacts would also occur on operator-maintained roads within the LMPA.

The Proposed Action would primarily generate increases in traffic volumes on WYO 372, US 189, LCR 311, SCR 8, SCR 52 and BLM Road 4202. These increases would result from the movement of project-related workers, equipment and materials to and from the project area to perform drilling, field development, well service, field operations and reclamation activities.

The largest increase in project-related traffic would occur during drilling and field development. Drilling and construction activities associated with each well would generate an estimated 366 one-way trips over the 30 day drilling and completion cycle.

The Proposed Action anticipates drilling 31 wells in three years. It is assumed that wildlife and seasonal stipulations would reduce the drilling period to 212 days in any given year. Based on these assumptions the peak year would involve drilling 11 wells, using one drilling rig, which would generate an estimated annual 3,190 one-way trips (1,595 round trips). This would be an average daily traffic (ADT) of 15 one-way trips per day over the 212-day drilling cycle, or an average annual daily traffic (AADT) increase of 9 trips on affected highways and roads. On peak days, traffic could reach 32 one-way trips. It is estimated that about 40 percent of all trips would involve trucks larger than 2½ tons. Development of central compression facilities would involve 10 to 15 trips /per day for a 45 day period.

During project operations, trips to service wells and ancillary facilities would be combined with trips to serve existing wells and facilities. It is assumed that incremental one-way trips would average less than 10 per day, except during well workovers, which might average 10 to 20 one-way trips/day for several days depending on the operations that would be performed.

State Highways

Figure 4-1 contrasts estimated Proposed Action-related traffic estimates with recent Wyoming Department of Transportation AADT counts on WYO 372, at the Sweetwater/Lincoln County line. ADT during the 212-day drilling period would be about 6 percent of 2001 AADT. Truck traffic during that period would be about 10 percent of average annual daily truck traffic in 2001. Peak day traffic associated with the Proposed Action would be about 12 percent of 2001 AADT. Truck traffic on the peak day would be about 32.5 percent of 2001 average annual daily truck traffic. This relatively small, short-term increase in traffic on WYO [illegible] should not result in a deterioration of the service level for that highway.

The estimated Proposed Action-related AADT would be about 3 percent of 2001 AADT on US 189, and therefore would not result in a deterioration of the service level on that highway.

County Roads

The Proposed Action would result in relatively small increases in traffic on the county roads that provide primary access to the LMPA (LCR 311, SCR 8, SCR 52 and BLM Road 4202) during the drilling and field development period. Excessive speed or use of the roads when they are muddy could damage road surfaces. Deteriorated roads would result in accelerated road maintenance requirements for the Lincoln and Sweetwater County Road and Bridge departments.

The Proposed Action-related increase in traffic would also increase the risk of damage to the Sweetwater County bridge over the Green River on SCR 8 (Gibbons 2003). The relatively minimal amount of light vehicle traffic that is anticipated to use LCR 318 would be less likely to damage the bridge on that road. The cost associated with accelerated road maintenance requirements and dust control on Sweetwater County roads may be offset by the Proposed

Action-related ad valorem and sales and use tax revenues generated to Sweetwater County government. However, the availability of substantial project-related revenues would lag county road maintenance requirements. Lincoln County would not receive tax revenues from the Project. Burlington and other area operators would continue to be responsible for maintaining BLM Road 4202.

Internal Roads

Section 2.2.2.1 (Road Construction) describes the measure proposed by the proponent to develop the transportation network necessary to access wells and ancillary facilities within the LMPA. According to the proponent, existing resource roads within the LMPA would be used to the extent feasible. Burlington anticipates constructing or reconstructing an estimated three miles of resource roads to access new well locations. Burlington would also be responsible for maintaining existing and new roads within the project area. New resource road locations would be identified in consultation with the AO and be designed, constructed and maintained in compliance with the standards contained in BLM Manual 9113.

4.13.1.2 Alternative A – No Action

Implementation of the No Action Alternative may result in increased traffic on State, county and resource roads, if gas leases are approved on a case-by-case basis. Transportation impacts similar to those described under the Proposed Action could occur, but at a reduced level, depending on the level of development that is ultimately approved.

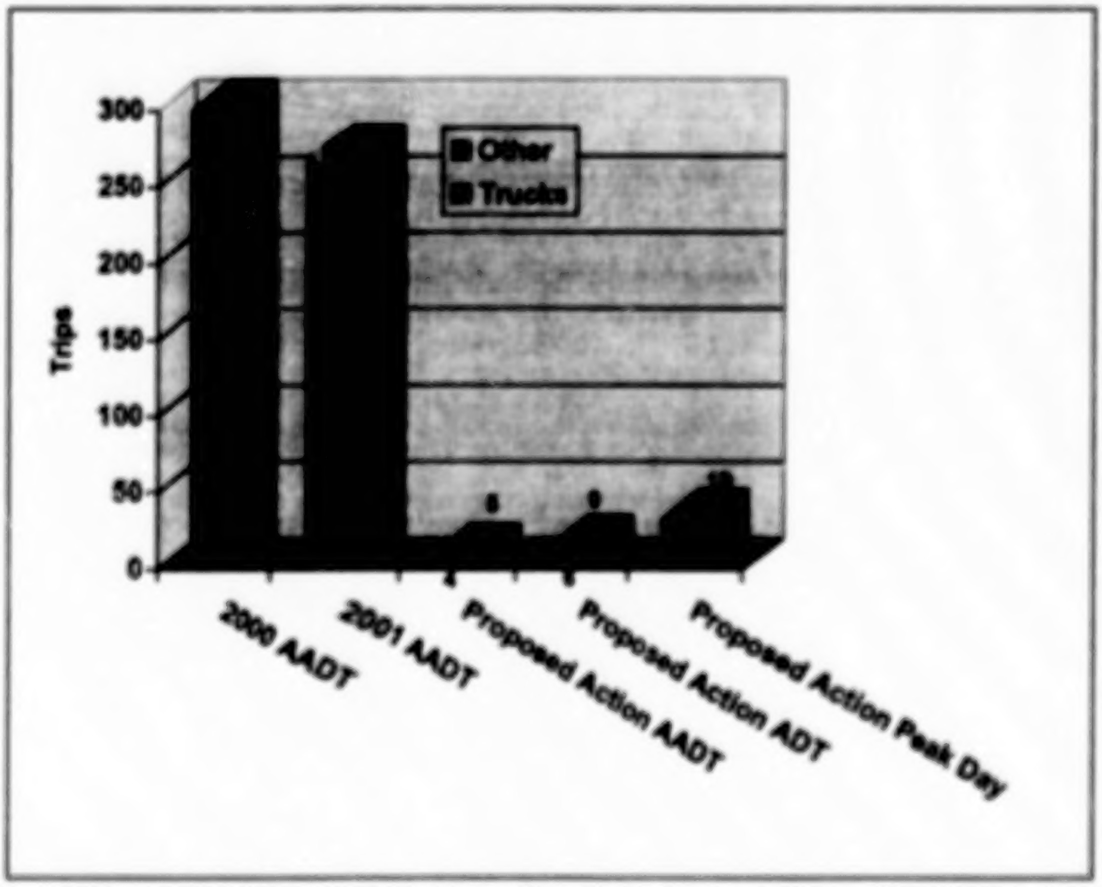
4.13.2 Mitigation

Mitigation for impacts on State highways would include rigorous adherence to WYDOT regulations regarding oversize and overweight loads. Mitigation for County Roads would include Burlington and contractor policies to reinforce speed limits and other traffic safety laws and to reinforce weight and width limits on one-lane bridges on SCR 8 and LCR 318.

4.13.3 Cumulative Impacts

Cumulative transportation impacts on County and operator maintained roads would generally be limited to ongoing oil and gas development and operations traffic and that associated with the Proposed Action. Some cumulative traffic impacts could be associated with construction of the Monell pipeline but these impacts would be relatively minimal and short-term. No adverse cumulative impacts from other RFFA's are anticipated.

Figure 4-1. Proposed Action-Related Traffic on WYO 372 compared to 2001 and 2002 AADT.



Sources: 2000 and 2001 AADT, WYDOT Vehicle Miles Book. Proposed Action AADT, ADT and Peak Day Traffic, Blankenship Consulting LLC.

4.13.4 Residual Impacts

Minor increases in traffic associated with production, well and pipeline service and reclamation activities would continue throughout the LOP.

4.14 HEALTH AND SAFETY

4.14.1 Impacts

4.14.1.1 Proposed Action

Potential health and safety effects associated with the Proposed Action would be similar in nature to those associated with existing conditions in the LMPA, but would occur at increased levels, especially during the drilling and field development phase of the project. Potential health and safety effects include occupational hazards associated with natural gas development and operations; risk associated with vehicular travel on county, BLM and operator-maintained roads; firearms accidents during hunting season and by casual firearms use such as plinking and target shooting; and natural events such as range fires.

Occupational Hazards

The BLM, OSHA, USDOT and WOGCC each regulate certain safety aspects of oil and gas development. Adherence to relevant safety regulations on the part of the operator and enforcement by the respective agencies would reduce the probability of accidents. Additionally, given the remote nature of the project area, and the relatively low use of these lands by others (primarily grazing permittees), occupational hazards associated with the Proposed Action would mainly be limited to employees and contractors rather than the public at large.

Pipeline Hazards

Increasing the miles of gathering and transmission pipelines within the LMPA would increase the chance of a pipeline failure. However, the relatively small amount of new pipeline associated with the Proposed Action, coupled with the low probability of failure and the remoteness of the project area would result in minimal risk to public health and safety. Signing of pipeline ROW's could reduce the likelihood of pipeline ruptures caused by excavation equipment, particularly in the vicinity of road crossings or areas likely to be disturbed by road maintenance activities.

Hazardous Materials

Drilling, field development and production activities require use of a variety of chemicals and other materials, some of which would be classified as hazardous. Potential impacts associated with hazardous materials include human contact, inhalation or ingestion and the effects of exposure, spills or accidental fires on soils, surface and ground water resources and wildlife.

The risk of human contact would be limited predominately to LMPA operator and contractor employees. The Hazard Communication Program, Spill Prevention Control and Countermeasure (SPCC) Plans, and other mitigation measures described in Section 2.2.2.9.6 would reduce the risk of human contact, spills and accidental fires, and provide protocols and employee training to deal with these events should they occur. Based on successful implementation of the above-listed plans and procedures, no adverse impacts associated with hazardous materials would be anticipated.

Other Risks and Hazards

Highway and road safety impacts are discussed in Section 4.13 (Transportation). Sanitation and hazardous material impacts would be avoided or reduced by the implementation of the mitigation measures outlined in Section 2.2.2.9.6.

The potential for firearms-related accidents would occur primarily during hunting season. The LMPA is believed to receive minimal hunting use and the increased activity during drilling and field development would be likely to further discourage hunting in the LMPA. Consequently the risk of fire arms-related accidents should be minimal. During project operations, the relatively few personnel on site would also result in minimal risk of firearms-related accidents.

The risk of fire in the project area would increase under the Proposed Action. This is an unavoidable impact associated with construction activities, industrial development and the presence of fuels, storage tanks, natural gas pipelines and gas production equipment. However, this risk would be reduced by the placement of facilities on pads and locations that are graded and devoid of vegetation, which could lead, to wildfires. In the event of a fire, property damage most likely would be limited to construction or production-related equipment and range resources. Fire suppression equipment, a no smoking policy, shutdown devices and other safety measures typically incorporated into gas drilling and production activities would help to minimize the risk of fire. There would be a heightened risk of wildfire where construction activities place welding and other equipment in close proximity to native vegetation. Given the limited public use and presence in the project area, the risk to the public would be minimal. There would be a small in increase in risk to area fire suppression personal associated with the Proposed Action.

Based on the foregoing assessment, risks to public health and safety should not adversely increase as a result of the Proposed Action.

4.14.1.2 Alternative A - No Action

The health and safety risks identified under the Proposed Action could also occur under the No Action Alternative, if leases are approved by the BLM on a case-by-case basis. The magnitude of risk would be dependent on the level of development that would occur, but is likely to be less than that associated with the Proposed Action. Operators would be subject to the same health and safety standards and regulations as under the Proposed Action, therefore, significant risks to public health and safety would not be anticipated under the No Action Alternative.

4.14.2 Mitigation

Burlington should coordinate emergency response planning with the Sweetwater County Emergency Management Agency and provide documentation regarding compliance with Federal Hazardous Material Regulations and the Uniform Fire Code.

4.14.3 Cumulative Impacts

Cumulative health and safety impacts within the LMPA would include those associated with existing oil and gas operations, proposed natural gas development and existing grazing and recreation activities. These combined activities would not pose significant risks to public health and safety.

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4.14.4 Residual Impacts

Risk to health and safety of workers, contractors and other users of the project area associated with industrial accidents, transportation accidents, shooting accidents and natural disasters would remain for the LOP. However, these risks would be small, given the remoteness of the area, the few employees and visitors anticipated and the proposed mitigation measures.

4.15 NOISE

4.15.1 Impacts

4.15.1.1 Proposed Action

Noise levels associated with drilling, field development and operations activities may temporarily exceed 55 dBA, but the lack of human residences and the low level of non project-related human occupation of the project area would result in non-adverse noise impacts under the criteria used for this assessment. Although noise impacts associated with compression facilities would be long term in duration, these same factors, lack of human residences and low human densities, would render compression noise impacts of small importance.

Implementation of the Proposed Action has the potential to create noise-generated impacts that emanate from machinery used during drilling and during construction of drill sites, pipelines, access roads and ancillary facilities, and from the operation of heavy trucks and related equipment. During field operations, noise would be generated by compression facilities, pumper trucks, road maintenance equipment and by well workover operations.

Noise associated with natural gas drilling, field development and field operations can affect human safety (at extreme levels) and comfort. Noise impacts can also modify animal behavior. The magnitude of noise impacts are contingent on a number of factors including the intensity and pitch of the source, air density, humidity, wind direction, screening/focusing by topography or vegetation, and distance to the observer. A variety of heavy equipment and machinery commonly used during drilling, field development and production operations generate noise levels in excess of the 55 dBA maximum standard. Noise impacts created by these activities are short term, lasting as long as drilling, construction or field maintenance activities are performed at well sites, access roads, pipelines, and ancillary facilities. Under typical conditions, noise levels decline below the 55 dBA maximum standard at a relatively short distance (less than one mile from the source) depending on the factors outlined above.

Drilling, field development and field operations workers would be the only groups directly affected by Proposed Action related noise disturbances for more than a brief period of time. These groups are subject to OSHA regulations regarding industrial noise protection. Grazing operators and recreation users of the area are few in number and would typically be affected by noise impacts only for the brief period required to pass by sites where drilling, field development and field operations occur.

Based on the foregoing and the noise mitigation measures contained in Section 2.2.2.9.3, noise impacts associated with the Proposed Action would not be adverse.

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4.15.1.2 Alternative A - No Action

Implementation of the No Action Alternative could result in noise impacts similar to those associated with the Proposed Action, but noise generating activities would likely occur at fewer locations on public land. Consequently noise impacts associated with the No Action Alternative would not be adverse.

4.15.2 Mitigation

No additional measures are proposed.

4.15.3 Cumulative Impacts

The Proposed Action, operations of the existing oil and gas facilities and occasional vehicular traffic associated with grazing operations and recreation visitors are the only noise-generating RFFA's anticipated for the LMPA. For the most part these noise-generating activities would be temporary and dispersed and therefore not anticipated to create adverse cumulative noise impacts.

4.15.4 Residual Impacts

Although both intermittent (field maintenance and workover activities) and long-term (compression facilities) exceedences of 55dBA noise levels would occur for the LOP, the lack of human residences and the low human occupation of the project area would render these impacts unimportant.

4.16 UNAVOIDABLE ADVERSE IMPACTS

4.16.1 Proposed Action

The Proposed Action would disturb approximately 91.4 acres, thus increasing the potential for wind and water erosion before the land is revegetated. Other unavoidable adverse impacts are a short-term loss of vegetation and forage production, the temporary loss of livestock forage, short-term impacts to air quality /noise levels due to construction activities, and possible temporary disruption of wildlife activities during construction.

4.16.2 Alternative A – No Action

Under the No Action Alternative, there would be no project-related beneficial economic impacts to local economies.

4.17 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT VS. LONG-TERM PRODUCTIVITY

4.17.1 Proposed Action

Short-term use of the environment would facilitate and enhance natural gas transportation and stimulate local economies. Environmental impacts would be short-term and not adverse. The proposed project would not adversely affect long-term use and would enhance long-term productivity related to natural gas supplies.

4.17.2 Alternative A – No Action

There would be no changes in short-term use under the No Action Alternative. Long-term productivity in terms of natural gas production would be less than under the Proposed Action.

4.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.18.1 Proposed Action

Irreversible or irretrievable commitments of resources would include the depletion of energy, materials, and manpower necessary to implement the Proposed Action.

4.18.2 Alternative A – No Action

There would be no project-related resource commitments under the No Action Alternative.

CHAPTER 5

CONSULTATION AND COORDINATION

CHAPTER 5

CONSULTATION AND COORDINATION

5.0 CONSULTATION AND COORDINATION

An environmental assessment (EA) must be prepared when a federal government agency considers approving an action within its jurisdiction that may impact the human environment. An EA aids federal officials in making decisions by presenting information on the physical, biological, and social environment of a proposed project and its alternatives. The first step in preparing an EA is to determine the scope of the project, the range of action alternatives, and the impacts to be included in the document.

The Council on Environmental Quality (CEQ) regulations (40 CFR, Parts 1500-1508) require an early scoping process to determine the issues related to the Proposed Action and alternatives that the EA should address. The purpose of the scoping process is to identify important issues, concerns, and potential impacts that require analysis in the EA and to eliminate insignificant issues and alternatives from detailed analysis.

The Little Monument Natural Gas Project EA was prepared by a third party contractor working under the direction of and in cooperation with the lead agency for the project, which is the Bureau of Land Management (BLM), Rock Springs Field Office, Rock Springs, Wyoming.

5.1 PUBLIC PARTICIPATION

A Scoping Notice was prepared and submitted to the public by the BLM on December 3, 2002 requesting input into the proposed Little Monument project. Scoping documents were sent out to the public listed on the BLM mailing list, as well as organizations, groups, and individuals requesting a copy of the scoping document.

There were ten written responses received during the scoping period. These written responses did not state a position in regard to the project but provided suggested mitigation if the project were implemented. The issues and concerns identified by the public during the scoping period are summarized in Chapter 1.

During preparation of the EA, the BLM and the consultant interdisciplinary team (IDT) have communicated with, and received or solicited input from various federal, State, county, and local agencies; elected representatives, environmental and citizens groups; industries; and individuals potentially concerned with issues regarding the proposed drilling action. The contacts made are summarized in the following sections.

The following organizations/individuals either provided comment or were provided the opportunity to comment during the scoping period.

CHAPTER 5: CONSULTATION AND COORDINATION

FEDERAL AGENCIES

U.S. Army Corps of Engineers
U.S. Representative Barbara Cubin
U.S. Senator Michael B. Enzi
USDI, BLM Kemmerer and Pinedale Offices
U.S. Fish and Wildlife Service
U.S. Senator Craig Thomas
USDI, BLM Wyoming State Office
U.S. Dept. of Energy

STATE AGENCIES

Governor, Dave Freudenthal
State Representatives
Wyoming Department of Transportation
Wyoming Oil and Gas Conservation Commission
Wyoming Department of Environmental Quality
State Senators
Wyoming Office of Federal Land Policy
Wyoming Game and Fish Department
Wyoming State Historic Preservation Office
Wyoming State Clearing House

COUNTY GOVERNMENT

Sweetwater County Commissioners
Lincoln County Commissioners
Sweetwater County Planner
Lincoln County Planner

MUNICIPALITIES

Mayor of Rock Springs
Mayor of Superior
Mayor of Green River
Postmaster of Farson

NATIVE AMERICAN TRIBES

Eastern Shoshone
Northern Ute
Northern Arapaho
Shoshone-Bannock Tribes

LOCAL MEDIA

A press release was sent to local media.

LANDOWNERS, INDUSTRY REPRESENTATIVES, AND GRAZING PERMITTEES

This scoping notice was sent to known property owners, industry representatives, and grazing permittees that would be affected by this project.

PUBLIC LAND USERS AND USER GROUPS

National Wildlife Federation
Oregon/California Trails Association
Southwest Wyoming Industrial Association
People for the West
Independent Petroleum Assoc. of Mountain States
Petroleum Association of Wyoming
Sierra Club Northern Plains Representative
Rocky Mountain Elk Foundation
Rock Springs Grazing Assoc.
Biodiversity Conservation Alliance
The Wilderness Society
The Nature Conservancy
Trout Unlimited
Western Mule Deer Foundation

Sierra Club – Wyoming Chapter	Wyoming Outdoor Council
Environmental Defense Fund	Wyoming Public Lands Council

5.2 LIST OF PREPARERS

The following tables identify the core BLM IDT (Table 5-1) and the consultant IDT (Table 5-2) that were principally involved with preparing this EA.

Table 5-1. List of BLM Interdisciplinary Reviewers

Name	Responsibility
ROCK SPRINGS FIELD OFFICE	
Teri Deakins	Project Manager
George Schoenfeld	Soils/Pipeline construction/reclamation
Susan Davis	Petroleum Engineer
Jim Dunder	Wildlife/T & E Issues
Kevin Lloyd	Range Management Specialist – Wild Horses
Jim Glennon	Zone Botanist
Terry A. Del Bene	Cultural Resources
Jo Foster	Recreation
Jennifer Bates	Realty
Dennis Doncaster	Hydrology/Water Quality
Jay D'Ewart	Range Conservation
Sherry Blackburn	Geology
Lance Brady	GIS
John Henderson	Fisheries
Ted Murphy	Acting Field Manager
Bernie Weynand	Acting Field Manager - Resources
WYOMING STATE OFFICE	
Susan Caplan	Air Quality

Table 5-2. List of Consultant Interdisciplinary Team EA Preparers

Principal Interdisciplinary Team		
Name	**Affiliation**	**Responsibility**
Gary Holsan	Gary Holsan Environmental Planning	Interdisciplinary Team Leader, Project Manager
Susan Connell	TRC Mariah	Air Quality
Jan Yerkovich	Western Archaeological Services	Cultural Resources
Charles Bucans, P.E.	Star Valley Engineering	Project Coordinator/Editor/Writer
Larry Hayden-Wing	Hayden-Wing Associates	Wildlife, Sensitive Species
Larry Bennett	Hayden-Wing Associates	Vegetation, Wetlands, Range, Wild Horses
Gus Winterfeld	Erathem Associates	Geology, Soils, Paleontology
Mike Evers	WWC Engineering	Water Quality
George Blankenship	Blankenship Associates	Recreation, Visual, Socioeconomics, Safety, Transportation, Noise
Connie Hedley	Hayden-Wing Associates	Technical Editor, Document Production

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APPENDIX A

WILDLIFE SPECIES OBSERVED OR THAT MAY OCCUR ON OR NEAR THE LITTLE MONUMENT PROJECT AREA.

Appendix A. Wildlife species observed or that may potentially occur on or near the Little Monument Project Area.

Common Name	Scientific Name	Data Sources*		
		WOS	ATLAS	WYNDD
BIRDS				
American avocet	*Recurvirostra americana*			
American bittern	*Botaurus lentiginosus*		y	
American coot	*Fulica americana*		y	
American crow	*Corvus brachyrhynchos*	y	y	
American dipper	*Cinclus mexicanus*		y	
American golden-plover	*Pluvialis dominicus*		y	
American goldfinch	*Carduelis tristis*		y	
American kestrel	*Falco sparverius*	y	y	
American pipit	*Anthus rubescens*		y	
American redstart	*Setophaga ruticilla*		y	
American robin	*Turdus migratorius*	y	y	
American tree sparrow	*Spizella arborea*	y	y	
American white pelican	*Pelecanus erythrorhynchos*		y	
American wigeon	*Anas Americana*	y	y	
Baird's sandpiper	*Calidris bairdii*	y	y	
Bald eagle	*Haliaeetus luecocephalus*		y	
Banded pigeon	*Columba fasciata*	y	y	
Bank swallow	*Riparia riparia*		y	
Barn owl	*Tyto alba*		y	
Barn swallow	*Hirundo rustica*		y	
Barrow's goldeneye	*Bucephala islandica*		y	
Bay-breasted warbler	*Dendroica castanea*		y	
Belted kingfisher	*Ceryle alcyon*		y	
Black burnian warbler	*Dendroica fusca*	y	y	
Black rosy-finch	*Leucosticte atrata*		y	
Black tern	*Chlidonias niger*		y	
Black-and-white warbler	*Mniotilta varia*		y	
Black-bellied plover	*Pluvialis dominicus*		y	
Black-billed magpie	*Pica pica*		y	
Black-capped chickadee	*Parus atricapillus*	y	y	
Black-chinned hummingbird	*Archilochus alexandri*		y	
Black-crowned night heron	*Nycticorax nycticorax*		y	
Black-headed grosbeak	*Pheucticus melanocephalus*		y	
Black-necked stilt	*Himantopus mexicanus*		y	
Blackpoll warbler	*Dendroica striata*		y	
Black-throated blue warbler	*Dendroica caerulescens*		y	
Black-throated gray warbler	*Dendroica caerulescens*		y	
Black-throated green warbler	*Dendroica virens*		y	
Blue grosbeak	*Guiraca caerulea*		y	
Blue grouce	*Dendragapus obscurus*		y	
Blue jay	*Cyanocitta cristata*		y	
Blue-gray gnatcatcher	*Polioptila caerulea*		y	
Blue-winged teal	*Anas discors*	y	y	
Blue-winged warbler	*Vermivora pinus*		y	
Bribolink	*Dolichonyx oryzivorus*		y	
Bohemian waxwing	*Bombycilla garrulus*		y	
Bonaparte's gull	*Spizella breweri*		y	
Brewer's blackbird	*Selasphorus platycercus*		y	
Brewer's sparrow	*Euphagus cyanocephalus*		y	
Broad-tailed hummingbird	*Selasphorus platycercus*		y	
Brown creeper	*Certhia americana*		y	
Brown thrasher	*Taxostoma rufum*		y	
Brown-headed cowbird	*Molothrus ater*		y	
Buff-breasted sandpiper	*Tryngites subruficollis*		y	
Bufflehead	*Bucephala albeola*		y	
Bullock's oriole	*Icterus bullockii*		y	
			y	

Appendix A. Wildlife species observed or that may potentially occur on or near the Little Monument Project Area.

continued

Common Name	**Scientific Name**	**Data Sources*** **WOS**	 **ATLAS**	 **WYNDD**
Burrowing owl	*Athene cunicularia*	y	y	y
California gull	*Larus californicus*		y	
Calliope hummingbird	*Stellula calliope*		y	
Canada goose	*Branta canadensis*	y	y	
Canada warbler	*Wilsonia canadensis*		y	
Canvasback	*Aythya valisineria*		y	
Canyon wren	*Catherpes mexicanus*		y	
Cape may warbler	*Dendroica tigrina*		y	
Caspian tern	*Sterna caspia*		y	
Cassin's finch	*Carpodacus cassinii*		y	
Cedar waxwing	*Bombycilla cedrorum*		y	
Chestnut-sided warbler	*Dendroica pensylvanica*		y	
Chipping sparrow	*Spizella passerina*		y	
Cinnamon teal	*Anas cyanoptera*	y	y	
Clark's grebe	*Aechmophorus clarkii*		y	
Clark's nutcracker	*Nucifraga columbiana*		y	
Cliff swallow	*Hirundo pyrrhonota*		y	
Common goldeneye	*Bucephala clangula*	y	y	
Common grackle	*Quiscalus quiscula*		y	
Common loon	*Gavia immer*	y	y	y
Common merganser	*Mergus merganser*	y	y	
Common nighthawk	*Chordeiles minor*		y	
Common poorwill	*Phalaenoptilus nuttallii*		y	
Common raven	*Corvus corax*	y	y	
Common redpoll	*Carduelis flammea*		y	
Common snipe	*Gallinago gallinago*	y	y	
Common tern	*Sterna hirundo*		y	
Common yellowthroat	*Geothlypis trichas*		y	
Connecticut warbler	*Oporornis agilis*		y	
Cooper's hawk	*Accipiter cooperii*		y	
Cordilleran flycatcher	*Empidonax occidentalis*		y	
Dark-eyed junco	*Junco hyemalis*		y	
Double-crested cormorant	*Phalacrocorax auritus*	y	y	
Downy woodpecker	*Picoides pubescens*	y	y	
Dunlin	*Calidris alpina*		y	
Dusky flycatcher	*Empidonax oberholseri*		y	
Eared grebe	*Podiceps nigricollis*	y	y	
Eastern kingbird	*Tyrannus tyrannus*		y	
European starling	*Sturnus vulgaris*		y	
Evening grosbeak	*Coccothraustes vespertinus*		y	
Ferruginous hawk	*Buteo regalis*	y	y	
Forster's tern	*Sterna forsteri*	y	y	
Fox sparrow	*Passerella iliaca*		y	
Franklin's gull	*Larus pipixcan*		y	
Gadwall	*Anas strepera*		y	
Golden eagle	*Aquila chrysaetos*	y	y	
Golden-crowned kinglet	*Regulus satrapa*		y	
Golden-winged warbler	*Vermivora chrysoptera*		y	
Grasshopper sparrow	*Ammodramus savannarum*		y	
Gray catbird	*Dumetella carolinensis*		y	
Gray flycatcher	*Empidonax wrightii*		y	
Gray jay	*Perisoreus canadensis*		y	
Gray partridge	*Perdix perdix*		y	
Gray-crowned rosy-finch	*Leucosticte tephrocotis*		y	
Great gray owl	*Strix nebulosa*		y	
Great horned owl	*Bubo virginianus*		y	
Great white-fronted goose	*Anser albifrons*		y	
Great-blue heron	*Ardea herodias*	y	y	

Appendix A. Wildlife species observed or that may potentially occur on or near the Little Monument Project Area.

continued **Data Sources***

Common Name	**Scientific Name**	**WOS**	**ATLAS**	**WYNDD**
Greater yellowlegs	*Tringa melanoleuca*		y	
Green-tailed towhee	*Pipilo chlorurus*		y	
Green-winged teal	*Anas crecca*	y	y	
Gyrfalcon	*Falco rusticolus*		y	
Hairy woodpecker	*Picoides villosus*		y	
Hammond'n flycatcher	*Empidonax hammondii*		y	
Harliquin duck	*Histrionicus histrionicus*		y	
Harris' sparrow	*Zonotrichia querula*		y	
Hermit thrush	*Catharus guttatus*		y	
Hermit warbler	*Dendroica occidentalis*		y	
Herring gull	*Larus argentatus*		y	
Hooded merganser	*Lophodytes cucullatus*		y	
Hooded warbler	*Wilsonia citrina*		y	
Horned grebe	*Podiceps auritus*		y	
Horned lark	*Eremophila alpestris*		y	
House finch	*Carpodacus mexicanus*		y	
House sparrow	*Passer domesticus*		y	
House wren	*Troglodytes aedon*		y	
Killdeer	*Charadrius vociferus*		y	
Lapland longspur	*Calcarius lapponicus*		y	
Lark bunting	*Calamospiza melanocorys*	y	y	
Lark sparrow	*Chondestes grammacus*		y	
Lazuli bunting	*Passerina amoena*		y	
Least bittern	*Ixobrychus exilis*		y	
Least flycatcher	*Empidonax minimus*		y	
Least sandpiper	*Calidris minutilla*		y	
Lesser scaup	*Aythya affinis*		y	
Lesser yellowlegs	*Tringa flavipes*		y	
Lewis' woodpecker	*Melanerpes lewis*		y	
Lincoln's sparrow	*Melospiza lincolnii*		y	
Loggerhead shrike	*Lanius ludovicianus*		y	
Long-billed curlew	*Numenius americanus*		y	
Long-billed dowitcher	*Limnodromus scolopaceus*		y	
Long-eared owl	*Asio otus*		y	
Macgillivray's warbler	*Oporornis tolmiei*		y	
Magnolia warbler	*Dendroica magnolia*		y	
Mallard	*Anas platyrhynchos*	y	y	
Marbled godwit	*Limosa fedoa*		y	
Marsh wren	*Cistothorus palustris*		y	
McCown's longspur	*Calcarius mccownii*		y	
Merlin	*Falco columbarius*	y	y	
Mountain bluebird	*Sialia currucoides*	y	y	
Mountain chickadee	*Parus gambeli*		y	
Mountain plover	*Charadrius montanus*		y	
Mourning dove	*Zenaida macroura*	y	y	
Mourning warbler	*Oporornis philadelphia*		y	
Nashville warbler	*Vermivora ruficapilla*		y	
Norhtern cardinal	*Cardinalis cardinalis*		y	
Northern flicker	*Colaptes auratus*	y	y	
Northern goshawk	*Accipiter gentilis*		y	
Northern harrier	*Circus cyaneus*	y	y	
Northern mockingbird	*Mimus polyglottos*		y	
Northern parula	*Parula americana*		y	
Northern pintail	*Anas acuta*	y	y	
Northern pygmy owl	*Glaucidium gnoma*		y	
Northern rough-winged swallow	*Stelgidopteryx serripennis*		y	
Northern saw-whet owl	*Aegolius acadicus*		y	
Northern shoveler	*Anas clypeata*		y	

Appendix A. Wildlife species observed or that may potentially occur on or near the Little Monument Project Area.

continued

Common Name	Scientific Name	Data Sources* WOS	ATLAS	WYNDD
Northern shrike	*Lanius excubitor*		y	
Northern waterthrush	*Seiurus noveboracensis*		y	
Olive-sided flycatcher	*Contopus borealis*		y	
Orange-crowned warbler	*Vermivora celata*		y	
Osprey	*Pandion haliaetus*	y	y	
Ovenbird	*Seiurus aurocapillus*		y	
Pectoral sandpiper	*Calidris melanotos*		y	
Peregrine falcon	*Falco peregrinus*		y	
Pied billed grebe	*Podilymbus podiceps*		y	
Pine grosbeak	*Pinicola enucleator*		y	
Pine siskin	*Carduelis pinus*		y	
Pinyon jay	*Gymnorhinus cyanocephalus*		y	
Piping plover	*Charadrius melodus*		y	
Plumbeous vireo	*Vireo plumbeus*		y	
Prairie falcon	*Falco mexicanus*	y	y	
Pygmy nuthatch	*Sitta pygmaea*		y	
Red crossbill	*Loxia curvirostra*		y	
Red phalarope	*Phalaropus fulicaria*		y	
Red throated loon	*Gavia stellata*		y	
Red-breasted merganser	*Mergus serrator*	y	y	
Red-breasted nuthatch	*Sitta canadensis*		y	
Red-eyed vireo	*Vireo olivaceus*	y	y	
Red-faced warbler	*Cardellina rubrifrons*		y	
Redhead	*Aythya americana*		y	
Red-headed woodpecker	*Melanerpes erythrocephalus*		y	
Red-naped sapsucker	*Sphyrapicus nuchalis*		y	
Red-necked phalarope	*Phalaropus lobatus*		y	
Red-tailed hawk	*Buteo jamaicensis*	y	y	
Red-winged blackbird	*Agelaius phoeniceus*		y	
Ring-billed gull	*Larus delawarensis*	y	y	
Ring-necked duck	*Aythya collaris*		y	
Ring-necked pheasant	*Phasianus colchicus*		y	
Rock dove	*Columba livia*		y	
Rock wren	*Salpinctes obsoletus*		y	
Rose-breasted grosbeak	*Pheucticus ludovicianus*		y	
Rough-legged hawk	*Buteo lagopus*	y	y	
Ruby-crowned kinglet	*Regulus calendula*		y	
Ruddy duck	*Oxyura jamaicensis*		y	
Ruffed grouse	*Bonasa umbellus*		y	
Rufous hummingbird	*Selasphorus rufus*		y	
Sage grouse, greater	*Centrocercus urophasianus*	y	y	
Sage sparrow	*Amphispiza belli*		y	
Sandhill crane	*Grus canadensis*	y	y	
Savannah sparrow	*Passerculus sandwichensis*		y	
Say's phoebe	*Sayornis saya*		y	
Semipalmated plover	*Charadrius semipalmatus*		y	
Semipalmated sandpiper	*Calidris pusilla*		y	
Sharp-shinned hawk	*Accipiter striatus*		y	
Sharp-tailed grouse	*Tympanuchus phasianellus*		y	
Short eared owl	*Asio flammeus*		y	
Snow bunting	*Plectrophenax nivalis*		y	
Snow goose	*Chen caerulescens*		y	
Snowy egret	*Egretta thula*		y	
Solitary sandpiper	*Tringa solitaria*		y	
Song sparrow	*Melospiza melodia*		y	
Sora	*Porzana carolina*		y	
Spotted sandpiper	*Actitis macularia*		y	
Spotted towhee	*Pipilo maculatus*		y	

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Appendix A. Wildlife species observed or that may potentially occur on or near the Little Monument Project Area.

continued		Data Sources*		
Common Name	**Scientific Name**	**WOS**	**ATLAS**	**WYNDD**
Steller's jay	*Cyanocitta stelleri*		y	
Stilt sandpiper	*Calidris himantopus*		y	
Summer tanager	*Piranga rubra*		y	
Swainson's hawk	*Buteo swainsoni*	y	y	
Swainson's thrush	*Catharus ustulatus*		y	
Tennessee warbler	*Vermivora peregrina*		y	
Three-toed woodpecker	*Picoides tridactylus*		y	
Townsend's solitaire	*Myadestes townsendi*		y	
Townsend's warbler	*Dendroica townsendi*		y	
Tree swallow	*Tachycineta bicolor*		y	
Trumpeter swan	*Cygnus buccinator*	y	y	
Tundra swan	*Cygnus columbianus*		y	
Turkey vulture	*Cathartes aura*		y	
Varied thrush	*Ixoreus naevius*		y	
Veery	*Catharus fuscescens*		y	
Vermilion flycatcher	*Pyrocephalus rubinus*		y	
Vesper sparrow	*Pooecetes gramineus*		y	
Violet-green swallow	*Tachycineta thalassina*		y	
Virginia rail	*Rallus limicola*		y	
Virginia's warbler	*Vermivora virginiae*		y	
Warbling vireo	*Vireo gilvus*		y	
Western grebe	*Aechmophorus occidentalis*	y	y	
Western kingbird	*Tyrannus verticalis*		y	
Western meadowlark	*Sturnella neglecta*	y	y	
Western sandpiper	*Calidris mauri*		y	
Western tanager	*Piranga ludoviciana*	y	y	
Western wood-peewee	*Contopus sordidulus*		y	
Whimbrel	*Numenius phaeopus*		y	
White-breasted nuthatch	*Sitta carolinensis*		y	
White-crowned sparrow	*Zonotrichia leucophrys*		y	
White-faced ibis	*Plegadis chihi*		y	y
White-throated sparrow	*Zonotrichia albicollis*		y	
White-winged scoter	*Melanitta fusca*		y	
Whooping crane	*Grus americana*		y	
Willet	*Catoptrophorus semipalmatus*		y	
Williamson's sapsucker	*Sphyrapicus thyroideus*		y	
Willow flycatcher	*Empidonax traillii*		y	
Wilson's phalarope	*Phalaropus tricolor*		y	
Wilson's warbler	*Wilsonia pusilla*		y	
Winter wren	*Troglodytes troglodytes*		y	
Wood duck	*Aix sponsa*		y	
Worm-eating warbler	*Helmitheros vermivorus*		y	
Yellow warbler	*Dendroica petechia*		y	
Yellow-billed cuckoo	*Coccyzus americanus*		y	
Yellow-breasted chat	*Icteria virens*		y	
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*		y	
Yellow-rumped warbler	*Dendroica coronata*	y	y	
MAMMALS				
Badger	*Taxidea taxus*	y	y	
Beaver	*Castor canadensis*	y	y	
Big-brown bat	*Eptesicus fuscus*		y	
Bighorn sheep	*Ovis canadensis*		y	
Bison	*Bison bison*		y	
Black bear	*Ursus americanus*	y	y	
Black-footed ferret	*Mustela nigripes*		y	
Black-tailed jackrabbit	*Lepus californicus*		y	
Bobcat	*Felis rufus*	y	y	
Brazilian free-tailed bat	*Tadarida brasiliensis*		y	

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Appendix A. Wildlife species observed or that may potentially occur on or near the Little Monument Project Area.

continued

Common Name	Scientific Name	Data Sources*		
		WOS	ATLAS	WYNDD
Bushy-tailed wood rat	*Neotoma cinerea*		y	
Coyote	*Canis latrans*	y	y	
Deer mouse	*Peromyscus maniculatus*		y	
Desert cottontail	*Sylvilagus audubonii*	y	y	
Dusky shrew	*Sorex monticolus*		y	
Dwarf shrew	*Sorex nanus*		y	
Elk	*Cervus elaphus*	y	y	
Fisher	*Martes pennanti*		y	
Golden-mantled groundsquirrel	*Spermophilus lateralis*		y	
Gray wolf	*Canis lupus*		y	
Grizzly bear	*Ursus arctos*		y	
Hoary bat	*Lasiurus cinereus*		y	
Idaho pocket gopher	*Thomomys idahoensis*		y	
Least chipmunk	*Tamias minimus*		y	
Least chipmunk	*Tamias minimus*		y	
Least chipmunk	*Tamias minimus*		y	
Least weasel	*Mustela nivalis*		y	
Little brown myotis	*Myotis lucifugus*		y	
Long-eared myotis	*Myotis evotis*		y	
Long-legged myotis	*Myotis volans*		y	
Long-tailed vole	*Microtus longicaudus*		y	
Long-tailed weasel	*Mustela frenata*		y	
Lynx	*Lynx lynx*		y	
Marten	*Martes americana*		y	
Masked shrew	*Sorex cinereus*		y	
Meadow vole	*Microtus pennsylvanicus*		y	
Mink	*Mustela vison*		y	
Montane vole	*Microtus montanus*		y	
Moose	*Alces alces shirasi*	y	y	
Mountain (Nuttall's) cottontail	*Sylvilagus nuttallii*	y	y	
Mountain lion	*Felis concolor*		y	
Mule deer	*Odocoileus hemionus*	y	y	
Muskrat	*Ondatra zibethicus*		y	
Northern flying squirrel	*Gluacomes sabrinus*		y	
Northern grasshopper mouse	*Onychomys leucogaster*		y	
Northern pocket gopher	*Thomomys talpoides*		y	
Olive-backed pocket mouse	*Perognathus fasciatus*		y	
Ord's kangaroo rat	*Dipodomys ordii*		y	
Pika	*Ochotona princeps*		y	
Porcupine	*Erethizon dorsatum*		y	
Pronghorn antelope	*Antilocapra americana*	y	y	
Pygmy rabbit	*Brachylagus idahoensis*		y	
Raccoon	*Procyon lotor*		y	
Red fox	*Vulpes vulpes*		y	
Red squirrel	*Tamiasciurus hudsonicus*		y	
Ringtail	*Bassariscus astutus*		y	
River otter	*Lutra canadensis*	y	y	
Sagebrush vole	*Lemmiscus curtatus*		y	
Short-tailed (ermine) weasel	*Mustela erminea*		y	
Snowshoe hare	*Lepus americanus*		y	
Southern red-backed vole	*Clethrionomys gapperi*		y	
Striped skunk	*Mephitis mephitis*		y	
Thirteen-lined groundsquirrel	*Spermophilus tridecemlineatus*		y	
Townsend's big-eared bat	*Plecotus townsendii*		y	
Vagrant shrew	*Sorex vagrans*		y	
Water shrew	*Sorex palustris*		y	
Water vole	*Microtus richardsoni*		y	
Western heather vole	*Phenacomys intermedius*		y	

Appendix A. Wildlife species observed or that may potentially occur on or near the Little Monument Project Area.

continued		Data Sources*		
Common Name	**Scientific Name**	**WOS**	**ATLAS**	**WYNDD**
Western jumping mouse	*Zapus princeps*		y	
Western small-footed myotis	*Myotis ciliolabrum*		y	
White-tailed deer	*Odocoileus virginianus*		y	
White-tailed jackrabbit	*Lepus townsendii*	y	y	
White-tailed prairie dog	*Cynomys leucurus*		y	
Wild horse	*Equus caballus*	y		
Wolverine	*Gulo gulo*		y	
Wyoming ground squirrel	*Spermophilus elegans*		y	
Yellow-bellied marmot	*Marmota flaviventris*		y	
Yellow-pine chipmunk	*Tamius amoenus*		y	
AMPHIBIANS				
Boreal chorus frog	*Pseudacris triseriata maculata*		y	
Boreal toad	*Bufo boreas boreas*		y	
Columbian spotted frog	*Rana luteiventris*		y	
Northern leopard frog	*Rana pipiens*		y	
Tiger salamander	*Ambystoma tigrinum*		y	y
REPTILES				
Eastern short horned lizard	*Phrynosoma douglassi brevirostre*		y	
Northern sagebrush lizard	*Sceloporus graciosus graciosus*		y	
Prairie rattlesnake	*Crotalus viridus viridus*		y	
Rubber boa	*Charina bottae*		y	
Valley garter snake	*Thamnophis sirtalis fitchi*		y	
Wandering garter snake	*Thamnophis elegans vagrans*		y	
Western plains garter snake	*Thamnophis radix haydeni*		y	

*Data Sources

- WGFD Wildlife Observation System (2000a)
- Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming (WGFD 1999)
- Wyoming Natural Diversity Database (2000)

APPENDIX B

WILDLIFE MAPS FOR MULE DEER, ELK, MOOSE.

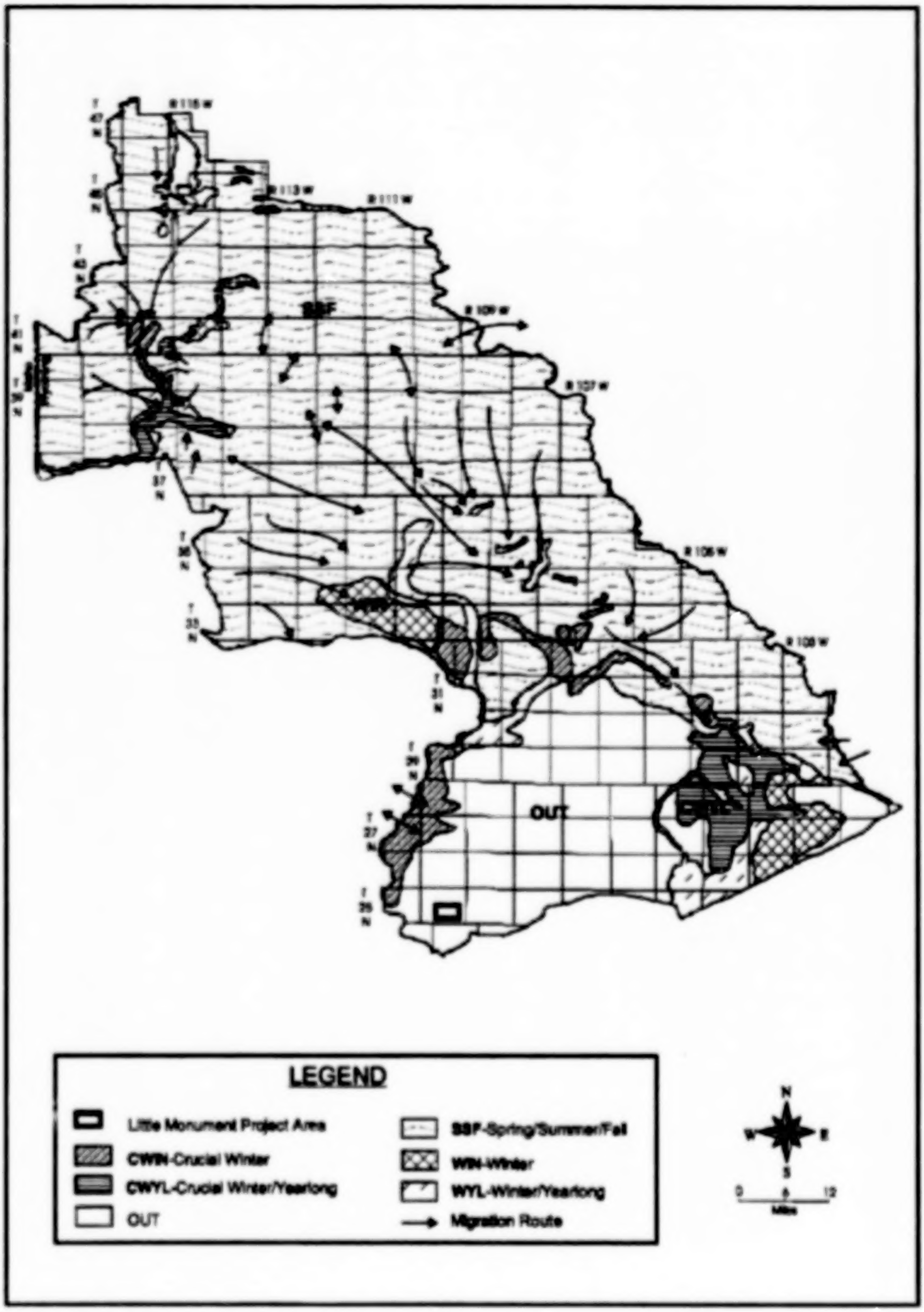

Figure B-1. Sublette Mule Deer Herd Unit Seasonal Ranges in Relation to the LMPA.

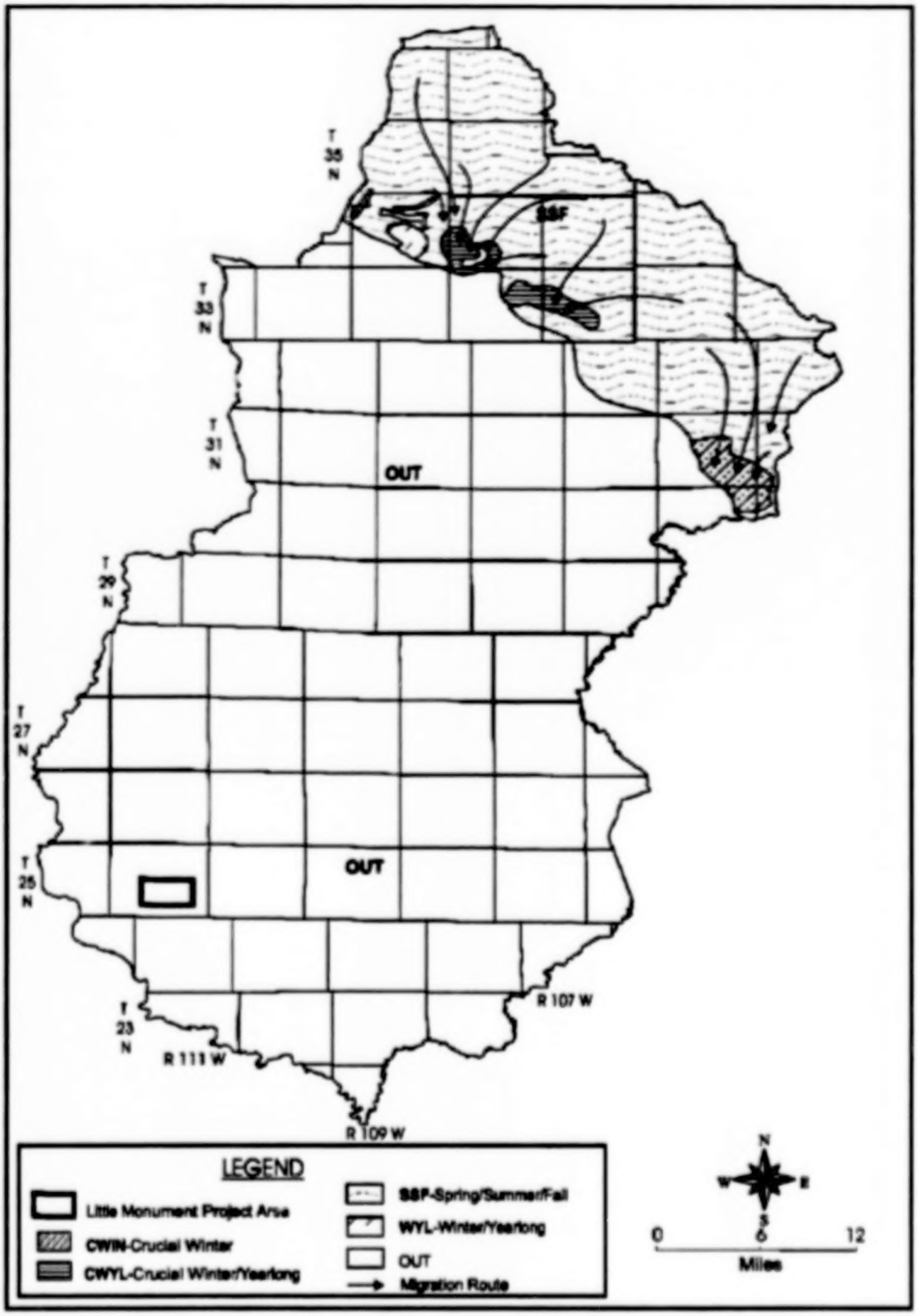

Figure B-2. Pinedale Elk Herd Unit Seasonal Ranges in Relation to the LMPA

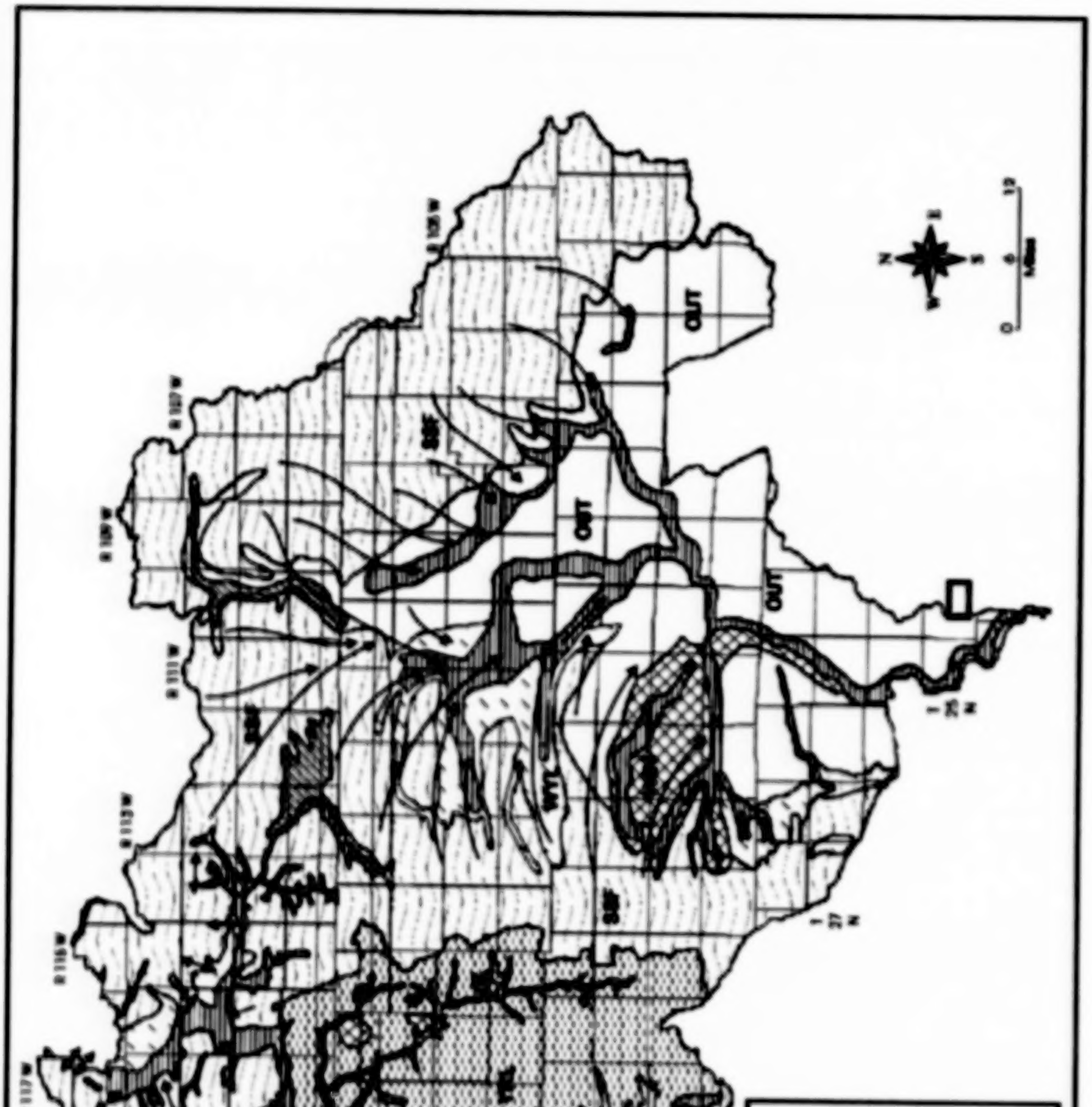

Figure B-3. Sublette Moose Herd Unit Seasonal Ranges in Relation to the LMPA

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END

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